February, 1947

THE FOUNDRY

wherever metals are cast...

A Preview of Our New Catalog

You have been waiting patiently for a new Stevens Catalog. Well, it's just around the corner; now in process of printing and binding. It will be big, up-to-date, complete—verily a "Foundry Encyclopedia".

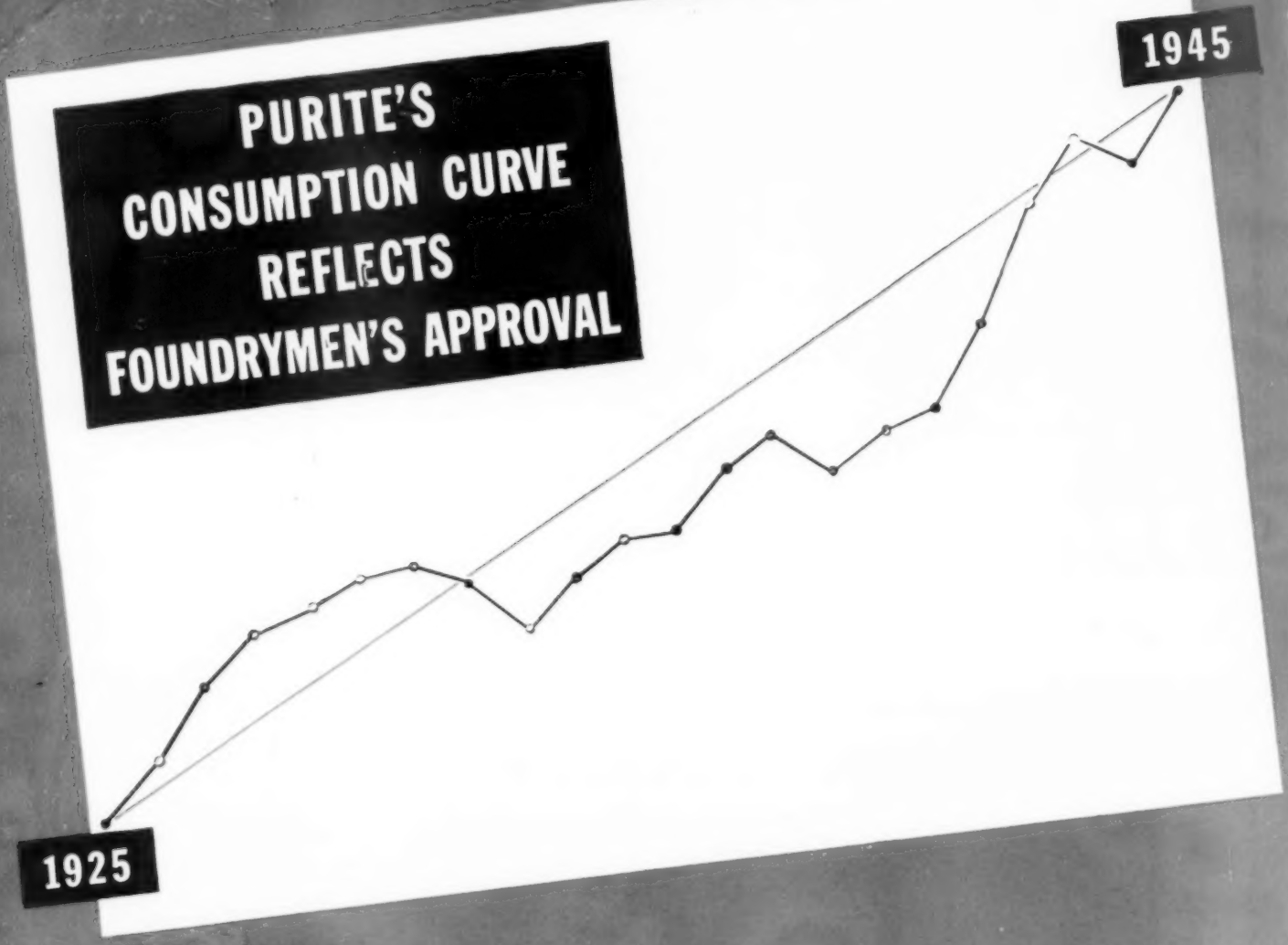
STEVENS EVERYTHING FOR A FOUNDRY

FREDERIC B. STEVENS INCORPORATED

DETROIT 26, MICHIGAN

NEW ENGLAND . . 166-182 Brewery St., New Haven, Conn.
NEW YORK and PENNSYLVANIA . 93 Stone St., Buffalo, N. Y.
• CANADA . FREDERIC B. STEVENS OF CANADA, LIMITED
• 1262 McDougall St. . . . Windsor, Ontario

PURITE'S CONSUMPTION CURVE REFLECTS FOUNDRYMEN'S APPROVAL



The steady climb of this consumption curve proves the value of Purite in refining cupola cast iron. The increasing demand for this scientific flux over a 20-year span is the best testimonial foundrymen can give to Purite.

Purite's remarkable action in desulphurizing and refining iron in the ladle or in the cupola hearth—its effect on combustion—and its action in smoothing out cupola melting operations are the reasons behind the ever-increasing use of Purite by progressive foundrymen everywhere.

Purite does more than remove sulphur; it purges molten metal of occluded gases, entrained oxide-silicates and other non-metallic impurities that may cause pinholes, gas pockets and segregated defects. Refining with Purite increases the strength . . . improves grain structure and machinability . . . speeds production of cleaner, sounder castings.

According to a recent survey, over 70% of the foundries in four principal casting centers in the North, South, East and Midwest are using Purite regularly. We feel you'll want to know why so many foundries consistently order Purite—so write for free factual information that tells how Purite helps them, and how it can help you in these competitive days.

Mathieson
CHEMICALS

THE MATHIESON ALKALI WORKS (INC.)
60 EAST 42nd STREET, NEW YORK 17, N. Y.
In Canada: Railway & Power Engineering Corporation, Limited.

Soda Ash . Bicarbonate of
oducts . Chlorine Dioxide
Gas . Sodium Methylate

99% PURE FUSED SODA ASH

PURITE

The Scientific Flux for Better Melting and Cleaner Iron

IT'S METAL REMOVED that counts

On the chipping floor it's actual metal removed that pays off. Sure, it's important to maintain correct air pressure and to keep your hammers in top condition. But don't overlook the necessity for having the right chisel steel for this specialized job.

For high chipping efficiency you've got to have a tool steel that stands up without complaint. Shanks and cutting edges must withstand the relentless, repeated impacting delivered by the hammer.

Yes, it takes a thoroughly proved steel to absorb this punishment for long periods without failure or excessive wear. And Bethlehem Omega is just such a steel. Its capacity for hard knocks is inbred.

Omega is essentially a silico-manganese steel with additions of molybdenum and vanadium to give it the desired combination of hardness and toughness. It responds readily to heat treatment and redressing.

Just any tool steel won't do! Whether you make up your own chisels and core breakers or whether you buy them direct, we recommend Bethlehem Omega for tough jobs in the foundry.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem Products are sold by Bethlehem Pacific Coast Steel Corporation

★ BETHLEHEM STEEL ★

OMEGA... one of Bethlehem's BIG 8 Tool Steels

The Answer is Found In the SHAKEOUT . . .

All the things that go into the preparation of a casting—skill, experience, judgement, equipment, materials—are locked in the sand after the metal is poured. The sand, then, carries the greatest burden of responsibility. FEDERAL GREEN BOND imparts any desired strength to the sand, thus eliminating guesswork and insuring results. Foundrymen all over the country place their trust in GREEN BOND day after day, because the pay-off is revealed in the shakeout—cleaner castings, fewer rejects and consistently better work.

GREEN BOND

The Best of the Bentonites

THE FEDERAL FOUNDRY SUPPLY COMPANY

4600 East 71st Street • Cleveland 5, Ohio

Seacoal Plant — Mines

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for FEBRUARY 1947

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for blowing

Sterling Faucet Company
Morgantown
W. Va.

"We take pleasure at is tir
for many years in mak g co
tures and trim which ve m
product and feel that ere i
blowing machines. It as be
any over the past man year

LINOIL

Not long ago core-blowing machines were a novelty and the few in operation were used for the simplest of cores. Today the machines are standard equipment and few are the small cores that cannot be made on them.

From the beginning Linoil was recognized as the logical oil for blown cores and it is safe to say that the vast majority of cores blown today are made with this oil.

The reason is not difficult to see. Linoil is a scientifically developed oil and it works perfectly in all types of machine-blown cores. The Linoil cores are pourous which promotes fast baking and free venting of gas in the pour. The small ratio of Linoil used greatly facilitates the venting problem, and reduces scrap. It also means tons more cores per drum of oil.

If you are using core blowing machines and are not using Linoil you are missing a bet that is sure to pay off.

Specify Linoil for your next order and enjoy the full possibilities of your machines. Enjoy the security which Linoil uniformity gives and the knowledge that your cores are going to behave properly in every operation from sand mixing to casting cleanout.

THE WERNER G.

(DIVISION OF ARCHER
2191 WEST 110 STREET WOODBINE

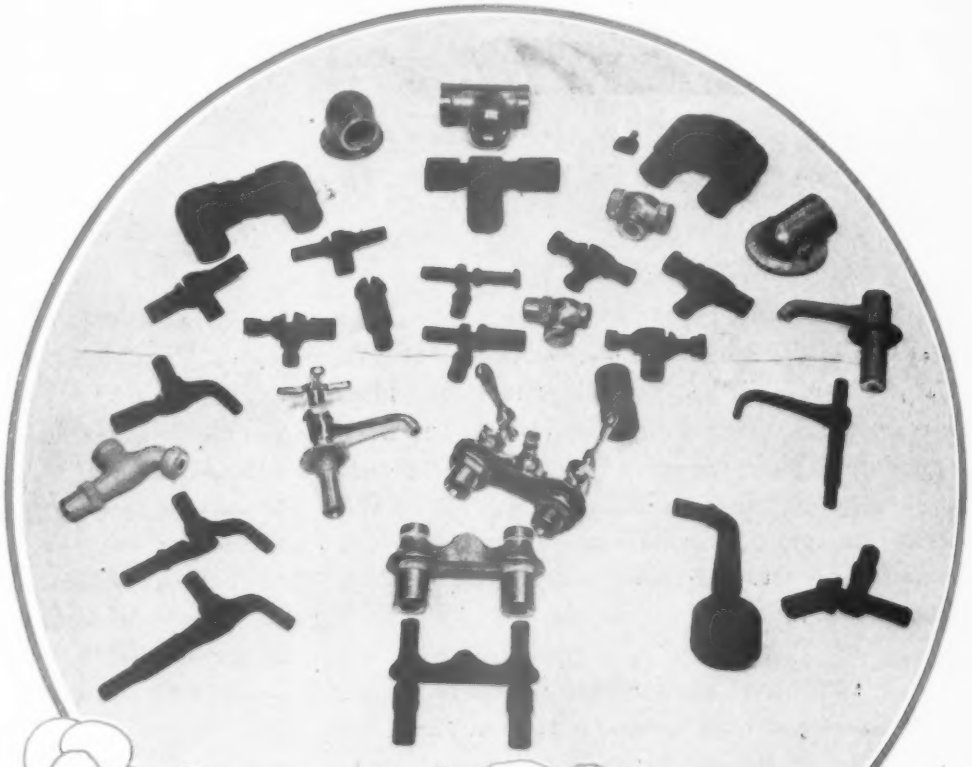
small cores - USE LINOIL

is time in testifying to the uniformity of Linoil. We have used it
g cores for small valves, faucets and other items of plumbers fix-
e manufacture. We have received wonderful results from your
ere is nothing to beat Linoil as a binder for making cores with core
as been a pleasure enjoying the business relations with your comp-
years."

I. W. Ruby, President

AN OUNCE OR A TON, CORES ARE UNIFORM WITH

LINOIL

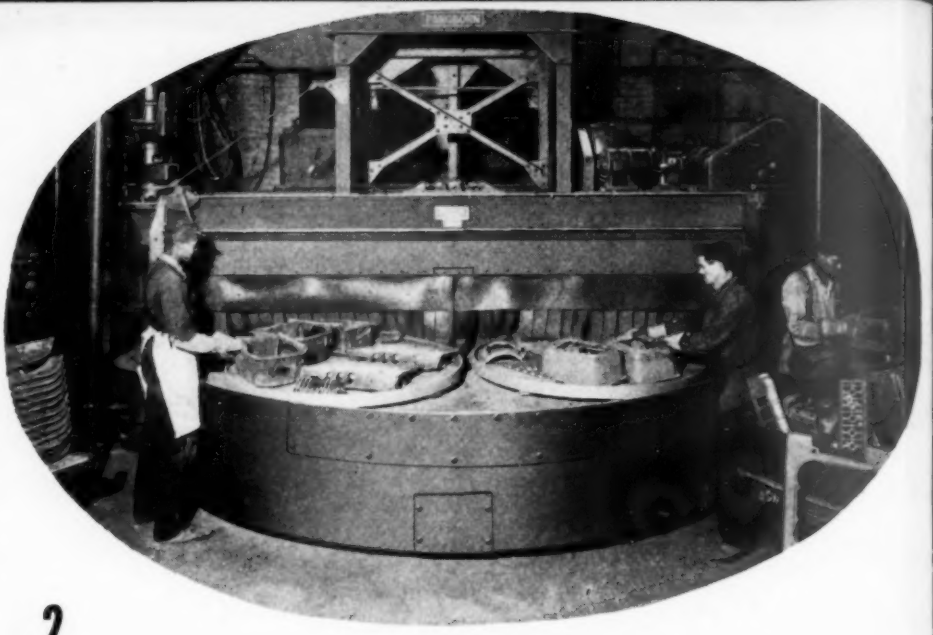


SMITH COMPANY

DANIELS - MIDLAND COMPANY)

4690 CLEVELAND 2, OHIO

1 . . . The popular ROTOBLAST* unit pictured above is standard Pangborn equipment on all rocker BARRELS, Rotary TABLES and Special CABINET Machines.



2

Pangborn

Blast Cleans Cheaper with the right equipment for every job

2 . . . **ROTOBLAST CLEANING TABLE for Airless Blast Cleaning of Flat and Fragile Work or Unusual Shapes.** Pangborn ROTOBLAST Table directs the blast stream onto the work, cleaning vertical and horizontal surfaces at the same time, giving all planes equal cleaning. Single-spindle tables: 6, 8, 12 and 14 ft. diam. Multiple-spindle tables: seven standard sizes from 4 ft. to 14 ft. diam., with auxiliary tables from 14 in. to 5 ft.

3 . . . **ROTOBLAST ROCKER TYPE BARREL for Airless Blast Cleaning of Work Handled in Batches.** Pangborn ROTOBLAST Rocker Barrel has exclusive Abrasive Separator and Cleaning System which restores usable abrasive to original cleanliness and efficiency by stratification and pneumatic handling. Six standard sizes.

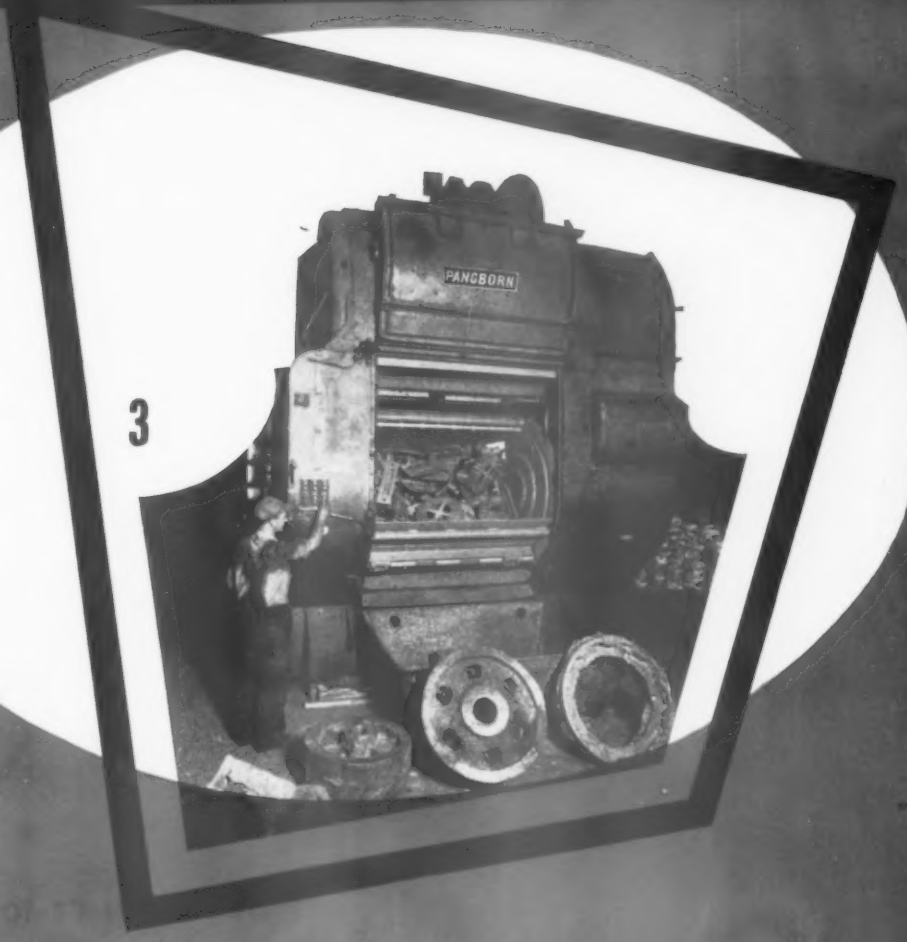
4 . . . **AIRLESS Cleaning Equipment, Custom Designed.** Pangborn Special ROTOBLAST Machines are individually designed for automatic cleaning of work which cannot be handled by tables or barrels. Over 40 years of blast cleaning experience is put to work on the design of these machines to fit individual requirements.

One large automobile foundry is using three of these special machines for cleaning cylinder blocks at the rate of 750 per hour. Cleaning costs are lowered 40% to 60%.

5 . . . **Air Blast Cleaning.** Pangborn also manufactures a complete line of air blast cleaning equipment, including blast tanks, cabinets, rooms and special machines.

To *blast clean cheaper,* Pangborn supplies the right type of air or airless equipment for every job. For complete information on how Pangborn equipment can increase your profits — by cutting blast cleaning costs, reducing machining time, facilitating inspection, improving quality, etc., write to Pangborn, *world's largest manufacturer of blast cleaning and dust control equipment.* Pangborn Corporation, 1300 Pangborn Boulevard, Hagerstown, Maryland.

*Trademark of the Pangborn Corporation



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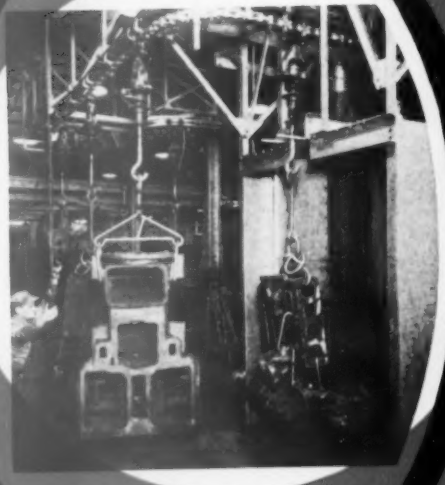

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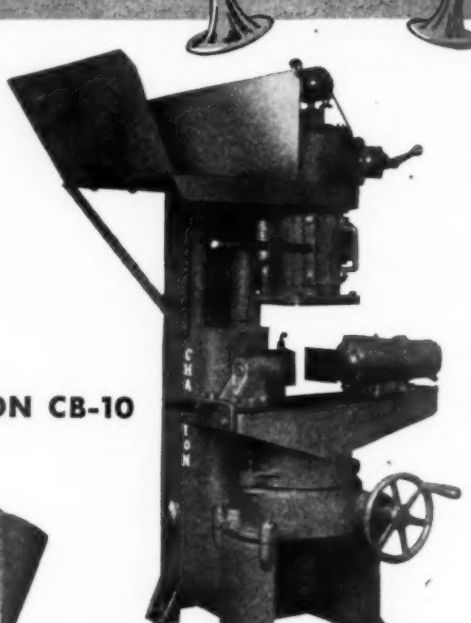
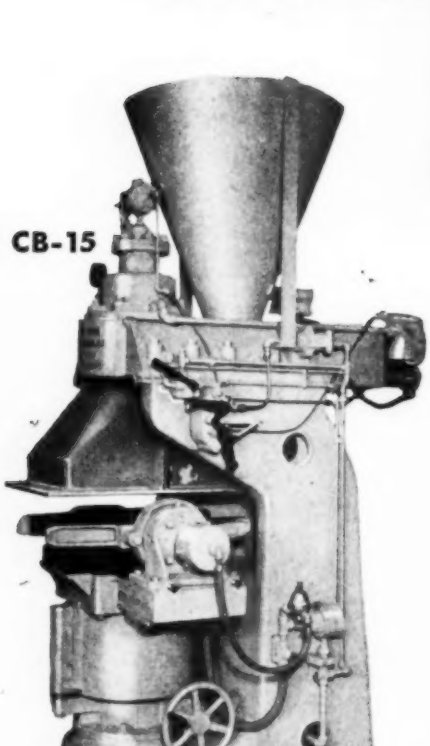
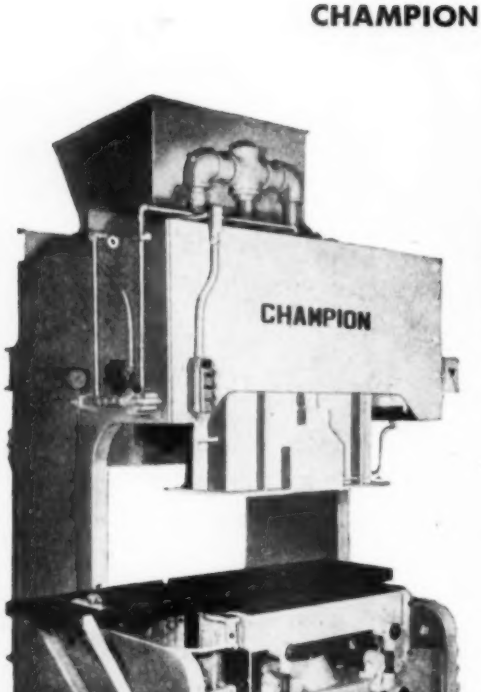
From a



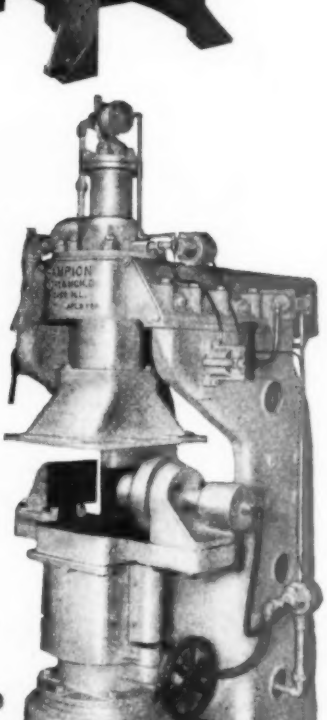
CHAMPION CB-10

CHAMPION CB-15





CHAMPION CB-12



CHAMPION CB-400

a Line of Champions

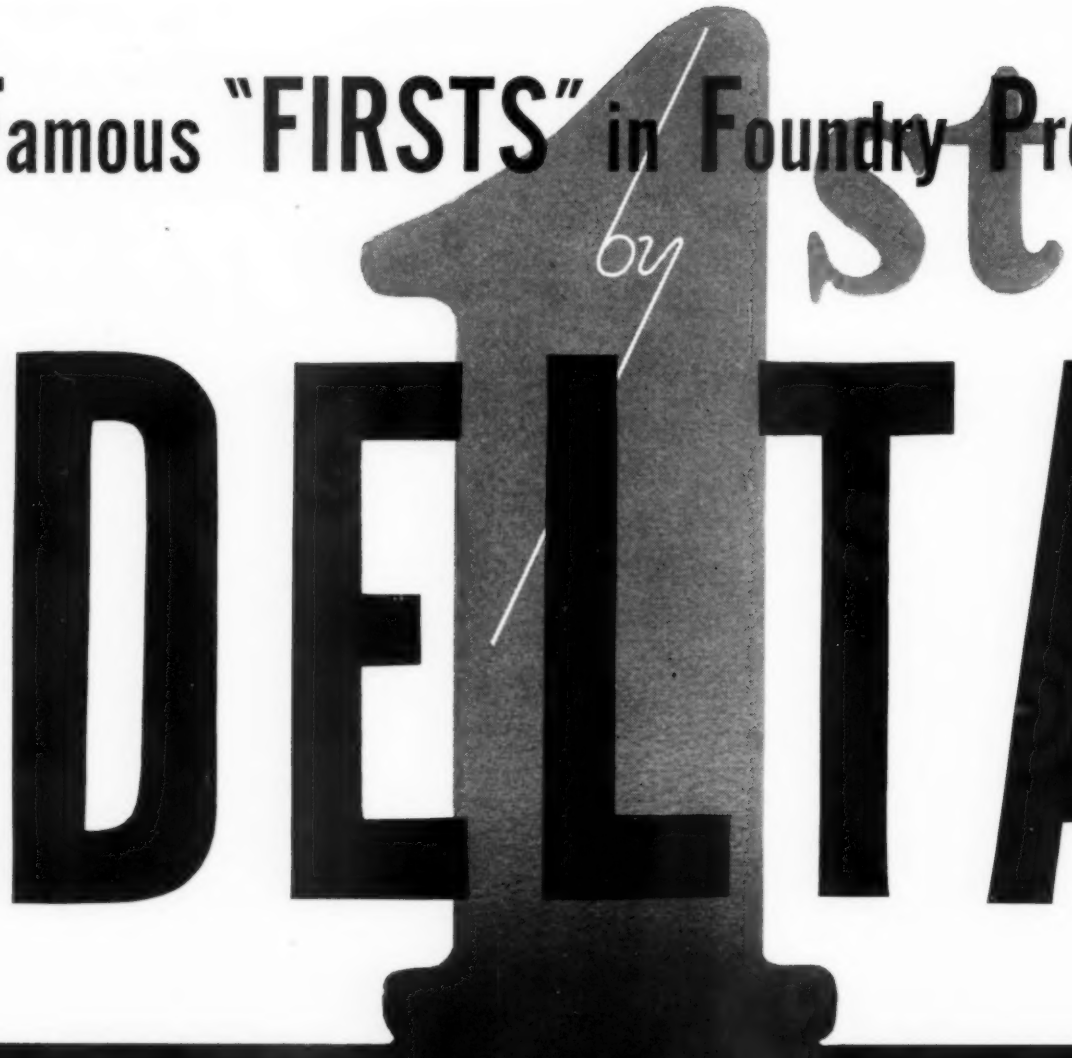
COMES A NEW CORE BLOWER . . .

The CB-18

Constantly seeking improved performance to keep abreast of the advances of the foundry industry, Champion engineers have developed the new model CB-18 Core Blower, a worthy member of the Champion family and qualified for a star position on your team. The Champion line of five machines offers a range of size that will meet the requirements of the great majority of foundries. Each model possesses those distinctive features that are enabling some of the world's leading foundries to produce more cores of uniformly higher quality. In the days just ahead, when competition becomes keener, you will be glad you have Champions working on your team!

CHAMPION FOUNDRY AND MACHINE CO.
1318 W. 21st STREET CHICAGO 8, ILLINOIS

Famous "FIRSTS" in Foundry Products



The following are some of the outstanding foundry product "FIRSTS" ... conceived and developed in DELTA research laboratories ... and now in popular use throughout the foundry industry all over the world.

- **PLASTIC-*type* Core & Mold Washes** — Highly refractory, Waterproof, Non-deteriorating.
- **NO-VEIN Compound** — Prevents veining and metal penetration.
- **CHILLKOAT** — Eliminates use of metal chills on Grey Iron Casting.
- **SPRAY BINDERS** — Produce dry sand mold properties.
- **PERMI-BOND** — The economical, highly efficient Seacoal Replacement.
- **PARTEX** — The original, and ONLY, Nut Shell Parting.
- **BONDITE** — The NEW Waterproof 100% Dry Binder.
- **MUDDING Compound** — A highly refractory material for patching joints.

Ask for detailed information and working samples of any of the above DELTA FOUNDRY "FIRSTS".

DELTA OIL PRODUCTS CO.

MANUFACTURERS OF FOUNDRY PRODUCTS, INDUSTRIAL AND AUTOMOTIVE OILS, GREASES AND COMPOUNDS

MILWAUKEE 9, WISCONSIN

SAVE
EXTRA HANDLING!

USE CMD *DUAL-PURPOSE CORE TRAYS*

The CMD Dual-Purpose Core Tray can be used for baking the cores, thus eliminating transfer of cores from core plate to core tray.

Because of their lock-stacking features, these trays make possible storage from the floor up. Bins and racks are no longer necessary.

SPECIFICATIONS

SIZE—12" X 24"

LOADING HEIGHT—4½"—6" OR 7"

OVERALL HEIGHT—5½"—7" OR 8"

WEIGHT—9½ POUNDS

MATERIAL—16 GA. SHEET METAL

SPOT WELDED (28 POINTS)

ALL ROUNDED CORNERS

2 BOTTOM REINFORCEMENT ANGLES

CONSTRUCTED FOR STACKING

CHICAGO MANUFACTURING & DISTRIBUTING CO.

Dept. 5F, 1928 West 46th St. · Chicago 9, Illinois

CMD

ANOTHER OUTSTANDING DSM INSTALLATION

DSM

CROSS FLOW CIRCULATION

FOR ACTUAL SURFACE CONTACT

Properly applied, DSM designed CROSS FLOW heating systems effects a gentle wiping action on all surfaces—sides —tops—bottoms—of your product, to be dried or processed. Resulting in speedier baking and a more uniform product.

Drying from center outwards avoids case hardening

WE WANT TO BUILD ***YOUR*** *OVENS*

PLANT ENGINEERING: *Consulting assistance in plant layout to coordinate departmental operations, our experience dated from 1917 in this field.*

Such plant layout may be based on increasing production beyond present capacity, or it may be a rearrangement in this post-war period when operations are conducted under a new set of conditions.

MOTOR CLEANING EQUIPMENT: *Washing machines for cleaning teardowns. Kerosene spray or similar solvent usually used as the cleaning medium.*

FORMED COWLINGS, PANELS, ETC.: *To your specifications, and of light metal alloys as required. Weldments and brazed assemblies may be under controlled atmosphere.*

PILOT EQUIPMENT: *Sample size equipment for development of heavy equipment.*

VERTICAL CORE BAKING OVENS • CONTINUOUS HORIZONTAL BAKING OVENS • BATCH TYPE CABINET OVENS • DRAWER OVENS

DETROIT SHEET METAL WORKS
1270 OAKMAN BOULEVARD, DETROIT 6, MICHIGAN

METAL FINISHING EQUIPMENT *by*

DETROIT SHEET METAL WORKS

1306 Oakman Boulevard DETROIT -6- MICHIGAN

PAINT SPRAY HEATING, VENTILATING, COOLING, DRYING, HUMIDIFYING SYSTEMS, JAPANNING AND INDUSTRIAL OVENS, INDUSTRIAL WASHING MACHINES

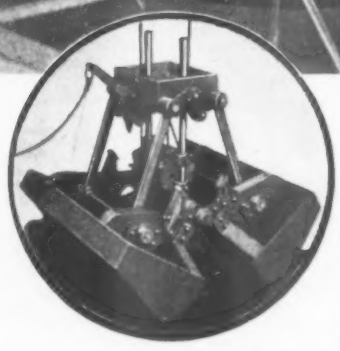
P&H'S ADDED VALUES IN CUPOLA CHARGING CRANES

Controlled or Fixed Discharge

● Fast, steady, low-cost cupola charging—whatever your conditions may be—is assured with P&H Charging Cranes. This mechanical means of charging permits you to increase your tonnage per heat.

You can drop the charge from a fixed height or you can control the charging height. With P&H charging buckets, you can spread charges evenly across the bed or around its perimeter.

Ask us to send your copy of Foundry Bulletin C-37 for further information.



P & H Single Line Grab Buckets for Foundries

Capacities of ½ to 2½ yards. Just hang one of these buckets on the crane hook and handle any bulk material—sand, crushed stone, coal, coke, cinders, etc. Unload cars, clean floors, dig pits, fill flasks . . . a labor-saver if there ever was one! Write for Bulletin C-27.

P&H

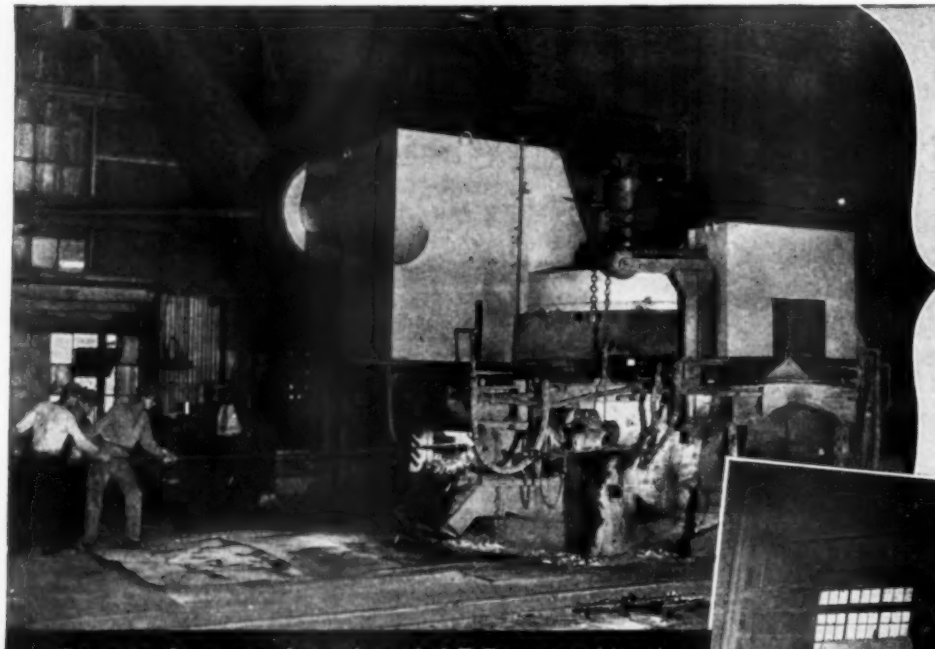
CUPOLA CHARGING CRANES

4405 W. National Ave.
Milwaukee 14, Wis.

HARNISCHFEGER CORPORATION

ELECTRIC CRANES · EXCAVATORS · ARC WELDERS · P&H · HOISTS · WELDING ELECTRODES · MOTORS

The right combination for
ELECTRIC FURNACE DUST CONTROL



Furnace in operation after AAF Furnace Hood and Roto-Clone installation

AAF
FURNACE HOOD
plus
AAF
ROTO-CLONE

Before AAF Furnace Hood and Roto-Clone installation.

The patented AAF furnace hood in combination with a Roto-Clone* combined exhauster and collector insures positive dust, smoke and fume control with a fraction of exhaust volumes used with general ventilation. Hood design is varied to suit the type and make of electric furnace on which it is to be used — either side or top charge. Roto-Clone maintains practically constant inflow of room air to hood, regardless of gas temperature, to obtain positive control during the entire melting cycle. The furnace hood installation shown here on a 12 ton Heroult side charge furnace is exhausted by a type N Roto-Clone.

Roto-Clone's record of positive dust control at every foundry operation is the result of years of dust engineering experience. Roto-Clones are available in three Types — Type W (wet) for general foundry dust control, particularly at shakeout, sand conditioning and abrasive cleaning; Type D (dry) for grinding and snagging; Type N (Hydro-static) for the safe collection of hazardous dusts. Write for free descriptive bulletins.

*Roto-Clone is a registered trademark for a dynamic precipitator or hydrostatic baffle-type wet collector.

AMERICAN AIR FILTER COMPANY, Inc.
Incorporated
266 Central Avenue, Louisville 8, Ky.
IN CANADA: DARLING BROS., LTD., MONTREAL, P. Q.

AAF
ROTO-CLONE
FOR FOUNDRY DUST CONTROL

ARE YOU HIRING *this kind* OF LABOR?

Why use manpower for work that can be done better and cheaper by machines? Whiting equipment for materials-handling and charging is providing the answer for many foundries to today's shortage of labor. It converts disgruntled employees into willing workers.

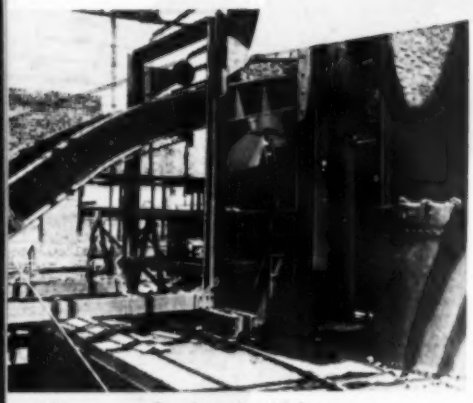
Now is the time TO MECHANIZE!

Present indications are that the labor situation will get worse—not better. Not only does mechanization make for better working conditions but it also reduces foundry costs . . . it changes break-even operations into profitable ones. Through controlled charging, foundrymen secure better melts and more uniform castings—improve the quality of their products.

Let WHITING *help you . . .*

WHITING Equipment

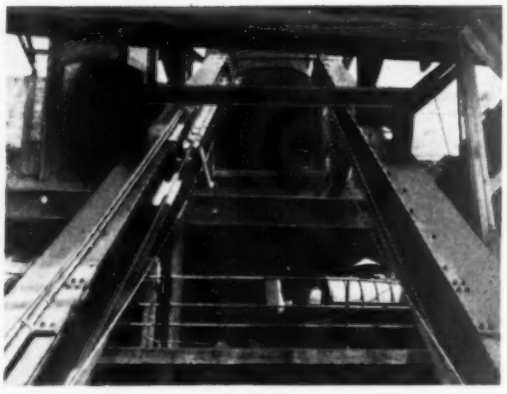
is tailored to the needs



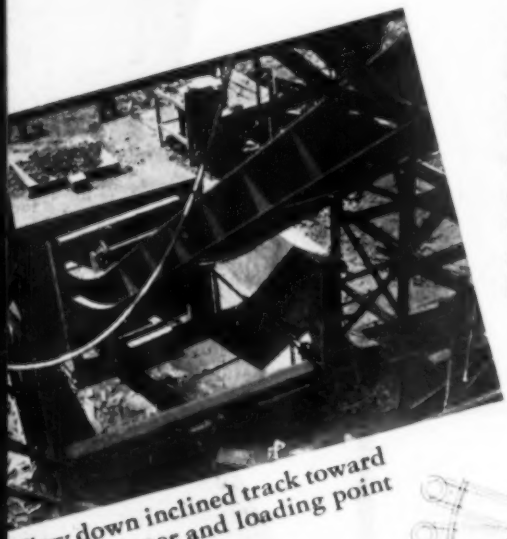
Upper end of swivel charger showing track it moves on

The New Swivel Charger

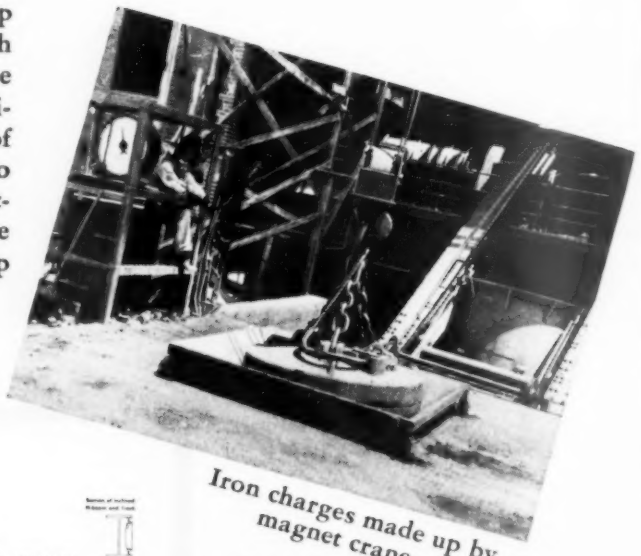
Two, three or four cupolas may be served with a Whiting Swivel Charger... it is a skip hoist pivoted below the weigh hopper, and designed so the upper end swings on a semi-circular track. Movement of the charger from cupola to cupola may be hand or electric powered. Buckets may be single leaf or double leaf drop bottom as desired.



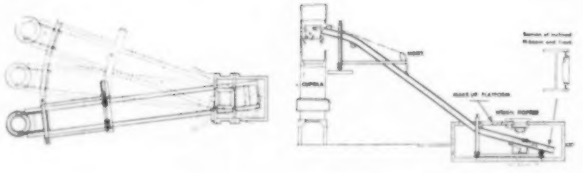
View up inclined track showing substantial I-beam frame



View down inclined track toward weigh hopper and loading point



Iron charges made up by magnet crane



Showing how the Whiting Swivel Charger serves multiple cupolas

Vertical side-dump skip charger

Side-Dump Skip Hoists

Side-Dump Skip Hoists are widely used for charging in smaller foundries. They are economical to install and operate, and they do away with the need for a charging floor. Whiting builds both vertical and inclined skip hoists suitable for indoor and outdoor use.

Loading vertical side-dump charger

of the individual foundry . . .

PLANT layout and arrangement, the number of cupolas and rate of operation, type of castings produced—these and many other factors must be considered in recommending the materials-handling and charging equipment best suited to a specific plant.

Whiting engineers are practical foundrymen, with a background of over sixty years developing time and labor saving equipment for foundries. They will gladly give you the benefit of their experience . . . ask them!

WHITING CORPORATION
15607 Lathrop Ave. Harvey, Illinois

Offices in Chicago, Cincinnati, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis, San Francisco, and Washington, D. C. Agents in other principal cities. Canadian Subsidiary: Whiting Corporation (Canada) Ltd., Toronto, Ontario. Export Department: 30 Church Street, New York 7, New York.

Materials-Handling Equipment

Whiting can supply well-engineered equipment for unloading cars, handling materials to and from storage, transferring charging buckets, and handling hot metal.

Iron makeup platform served by magnet crane

Batch weigh hopper for accurate proportioning of charges

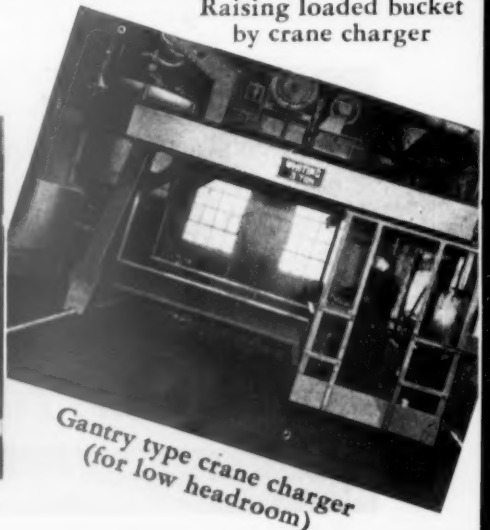
Raising loaded bucket by crane charger

Crane Type Chargers

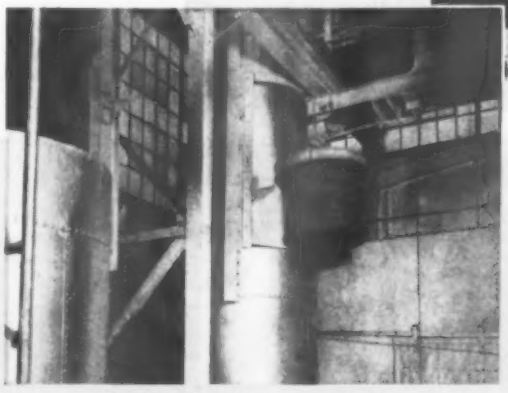
Whiting provides all types of crane chargers including overhung, underslung, gantry, monorail and jib crane chargers using cone bottom buckets. Many Whiting installations have seen years of service.

Charging crane places loaded bucket in cupola

Monorail type crane charger



Gantry type crane charger (for low headroom)



Underslung crane serves two cupolas

WHITING
Labor Saving Equipment
FOR FOUNDRIES

STERLING PATENTED FEATURES

1. Solid rolled flanges with full-width bearing.
2. Sturdy all-steel webs of ¼" or ⅜" thickness.
3. Solid center reinforcing bars to prevent distortion.

(Patent No. 1974292)

STYLE ⅜ NT-NNT FLASK — 36" x 48" x 14" x 10". Equipped with heavy duty malleable clamps and steel clamping bars.

STLYE ⅜ NN-N FLASK — 38" x 73" x 20" x 18". Equipped with lifting loops instead of trunnions. Double center bar on cope.

STERLING Flasks are made to meet the toughest production schedules! Year in, year out, they retain their rigidity and accuracy under constant production pressure . . . and heaviest production demands. You'll find STERLING Flasks *engineered* for durability and custom-built to meet *your* requirements. For *complete* foundry flask service, consult STERLING.

STERLING FLASKS ARE USED IN MORE THAN 4000 FOUNDRIES!

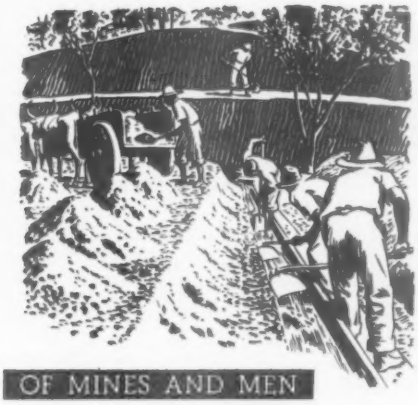
Sterling FOUNDRY FLASKS

STERLING WHEELBARROW COMPANY • MILWAUKEE 14, WIS., U. S. A.

THE STORY OF ZIRCONIUM

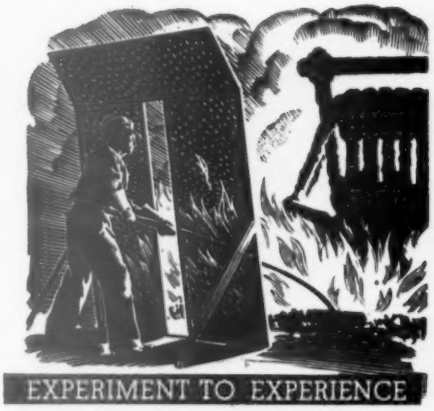
MULTI-LINGUAL

1 Ancient Persians used the word "zargun" to mean gold-colored. The term "zargun" has become "zircon" through the Arabic, Portuguese, and French languages. The mineral zircon has yielded the element "zirconium," first isolated in 1824 by the Swedish chemist Berzelius.



OF MINES AND MEN

2 From deposits in the United States, Australia, South America, and other parts of the world, ores travel great distances to electric furnaces where they are converted to zirconium alloys. But first the clay and slimes are washed from the ore, as shown in this South American mining scene.

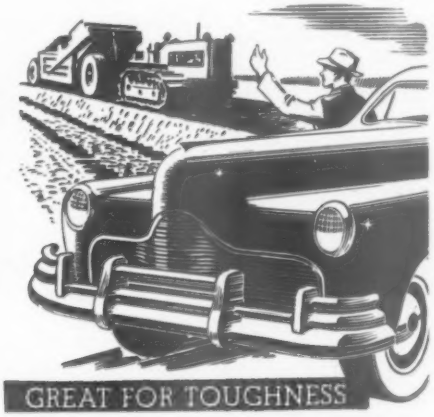


EXPERIMENT TO EXPERIENCE

3 Prior to the entrance of the United States into the first World War, Electromet was conducting experimental work on zirconium alloys, and was able to produce these alloys in large quantities. Again, throughout World War II, Electromet met far greater requirements for zirconium.

VERSATILE PERFORMER

4 Zirconium alloys are of great service to the steelmaker. Not only is zirconium a powerful deoxidizer, but it is extremely reactive with nitrogen and sulphur as well. Generally used as a ladle addition, zirconium alloys are sometimes added to the bath when steel is made in electric furnaces.



GREAT FOR TOUGHNESS

5 For high-strength steel parts which must be cold-formed, zirconium is important. Rock drills, rails, axles, and crankshafts—all requiring maximum toughness—benefit by additions of zirconium alloys because of their thorough deoxidation and cleansing effect. Depth hardenability is increased.

Questions on Alloys?

Electromet produces alloys of 12 to 15 per cent and of 35 to 40 per cent zirconium, as well as other special zirconium-containing alloys. To aid ferro-alloy users in selecting the proper alloy for their needs, Electromet's staff of experienced metallurgists stands ready to assist you. An explanation of this unique service, and descriptions of Electromet products are included in the booklet, "Electromet Ferro-Alloys and Metals," available by writing our Technical Service Department.

ELECTRO METALLURGICAL COMPANY
Unit of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.

ELECTROMET Ferro-Alloys and Metals are sold by Electro Metallurgical Sales Corporation, and Electro Metallurgical Company of Canada, Limited, Welland, Ontario.

Electromet
TRADE MARK
Ferro-Alloys & Metals

The 12"-38" Adams Jolt Squeezer, Portable Type

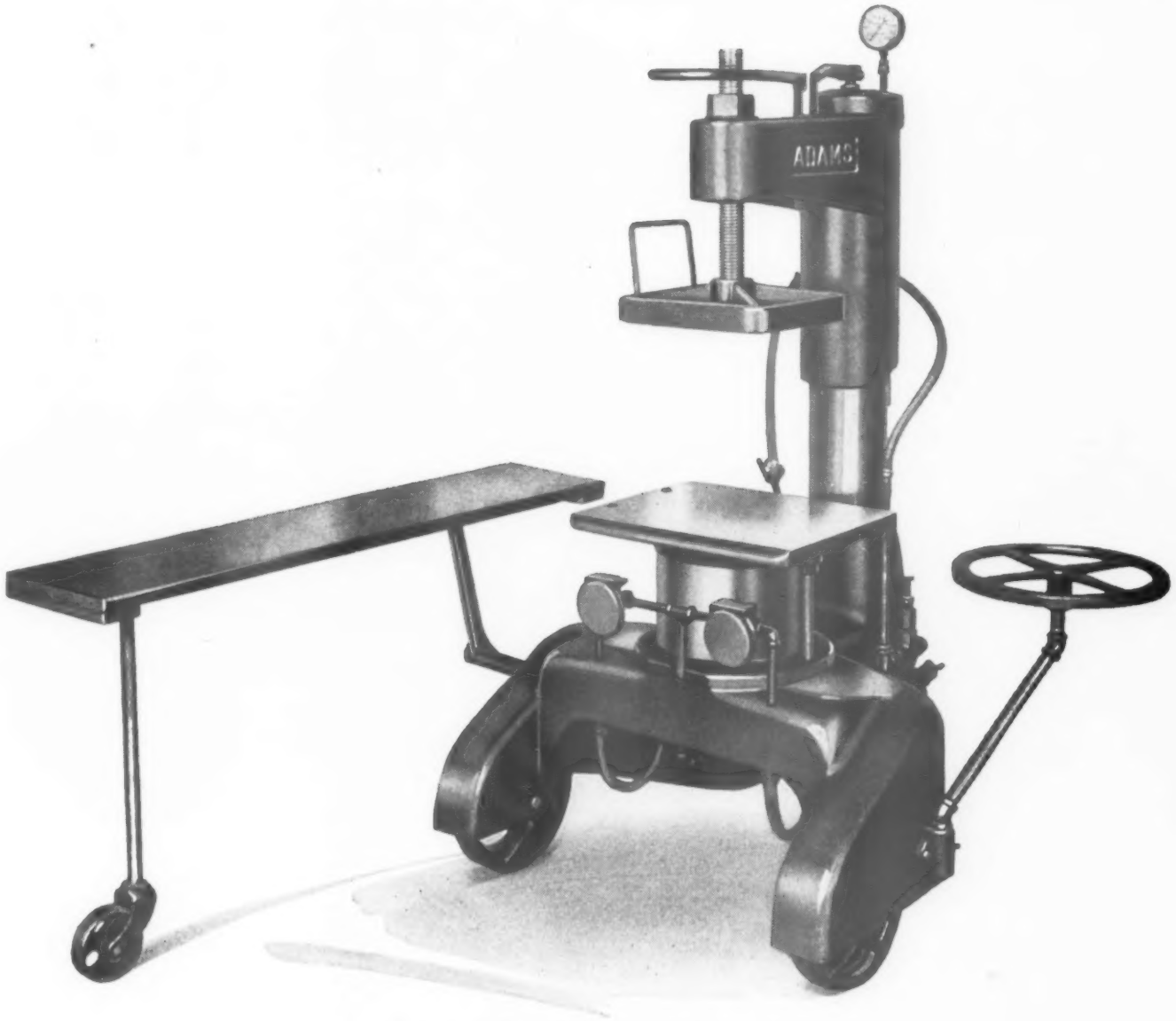
Produce Efficiently...Use

EFFICIENT DESIGN—Simplicity in design has been a characteristic of Adams Molding Machines for the past fifty years. The importance of this factor is expressed in the efficient performance of our current line.

PRECISION MANUFACTURE—The most modern equipment is used in the manufacture of these machines, and unusually close tolerances have been established. All parts are interchangeable.

THE ADAMS COMPA

MOLDING MACHINES · FLASK



The 10" Post Type Jolt Squeezer, Portable Type

Adams Molding Machines

LESS MAINTENANCE—Careful selection of materials and reduction of moving parts to a minimum makes upkeep negligible. Centralized automatic lubrication and protection against sand and dust assist in reducing wear.

EASY OPERATION—Everything possible has been done to provide convenience for the operator, and this is reflected in increased output. Operating controls are properly located to reduce lost motion.

NY · DUBUQUE, IOWA · U.S.A.

EQUIPMENT · Established 1883

Sterling

"THE WHEELS OF INDUSTRY"

SNAGGING is a "daily grind" that is made easier and quicker by using Sterling's Vitrified or Resinoid Grinding Wheels, especially developed for the job they are to do. For cool operation and faster metal removal, they are ideal because they are built to job-tested formulas for all types of mills and foundries.

What's your problem—casting cleaning, billet grinding, snagging large or small pieces? Whatever it is, there is a Sterling Grinding Wheel built especially to end your grinding worries.

A consultation with a Sterling engineer in your plant . . . right on the job . . . will do much to eliminate trouble-some delays, operator fatigue, and slowed-up schedules. Write today.

The Sterling Specification Selector lists all types of wheels for foundry and steel mill grinding. Send for it now!

• STERLING ABRASIVES •

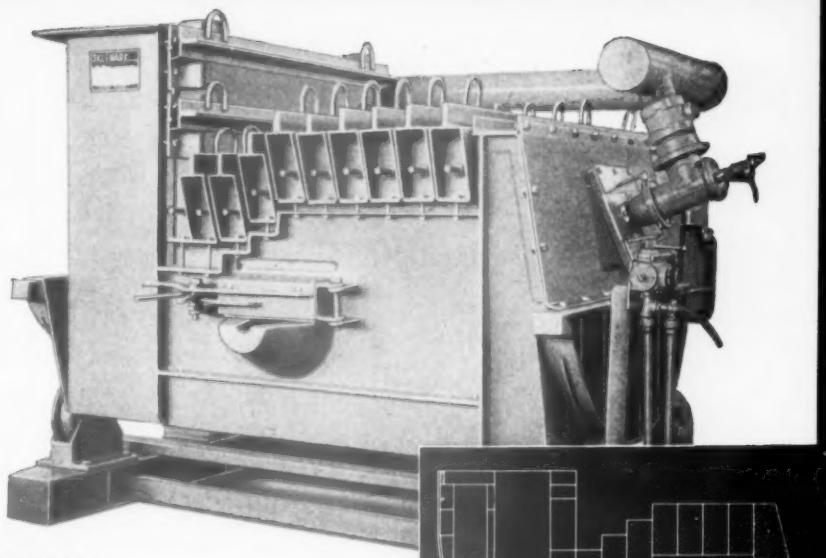
THE
STERLING GRINDING WHEEL DIVISION
OF THE CLEVELAND QUARRIES COMPANY
TIFFIN, OHIO

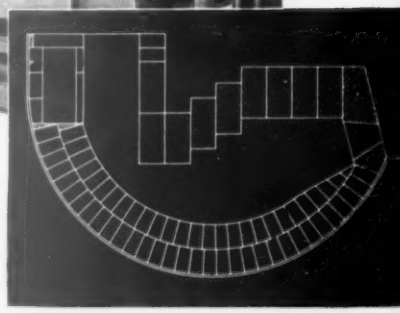
THE WHEELS OF INDUSTRY

Speed + STAMINA = STROMAN FURNACE PERFORMANCE

SKLENAR FURNACES

For Melting Brass, Bronze, Aluminum, Sklenar Non-Crucible, Direct Fired, Improved Reverberatory Melting Furnaces are the fastest melting furnaces built. Their design is unique. Metal is charged into a hopper which is also an exhaust from the combustion chamber. Here metal is preheated and melted at the throat of the hopper. Cold metal does not reach the molten bath. Charging is continuous. These furnaces will show fuel savings up to 40%; as the combustion chamber is heated by the same fuel used to melt metal in the throat of the hopper. They are also very successful in the making of Grey Iron Castings. The furnace Illustrated is the 1000 lb. size, and is oil fired. Gas fire is also available. Full information upon request.





STROMAN MANUAL TILT CRUCIBLE MELTING FURNACES

For Brass, Bronze, Aluminum

This illustrates a gas fired unit with two gas burners. Accessories for the mixing of gas and air in correct proportions are also shown and are furnished with the unit. This is the most modern and efficient means of burning gas that is known today. Furnaces up to and including No. 100 crucible are equipped with one gas burner. Larger sizes are furnished with two burners.

STROMAN CRUCIBLE STATIONARY MELTING FURNACES

For Brass, Bronze, Aluminum and other non-ferrous metals

Sturdy, efficient and featuring the Stroman Push-Back Cover, these stationary furnaces are designed for peak production and greatest fuel economy. Oil or Gas Fire. Capacities from No. 20 to No. 400 Crucible.

Write immediately for full information TO NEW ADDRESS

STROMAN STATIONARY CRUCIBLE MELTING FURNACES

For Aluminum and other White Metal Alloys

These furnaces are designed primarily for use in permanent mold and die casting plants. They are equipped with a special shield to protect operators against excessive heat . . . are most efficient in operation . . . and handle capacities from 200 to 820 pounds of Aluminum. They may also be used as holding or breakdown furnaces. Oil or Gas fired.

STROMAN FURNACE & ENGINEERING CO.

DIVISION OF

THE PETERSEN OVEN CO. • 9900 FRANKLIN AVE. • FRANKLIN PARK, ILL.

VELSICOL

LIGHT-COLOR

CORESIN OILS

7 point superiority

UNIFORMITY—insured by rigid laboratory control

WORKABILITY—exceptionally clean in core blowing machines

FAST BAKING—no overbaking—stable after polymerization

LOW GAS EVOLUTION—eliminates blow holes

COLLAPSIBILITY—fast, easy shakeout—low cleaning room costs

ECONOMY—reduces amount of oil required in mix

EFFICIENCY-assured by specially synthesized hydrocarbon resin

Your own tests will prove that VELSICOL light-color Coresin Oils offer greater economy—are geared to greater castings production in your foundry.

A generous trial sample and complete information as applied to your particular problem are yours without obligation.

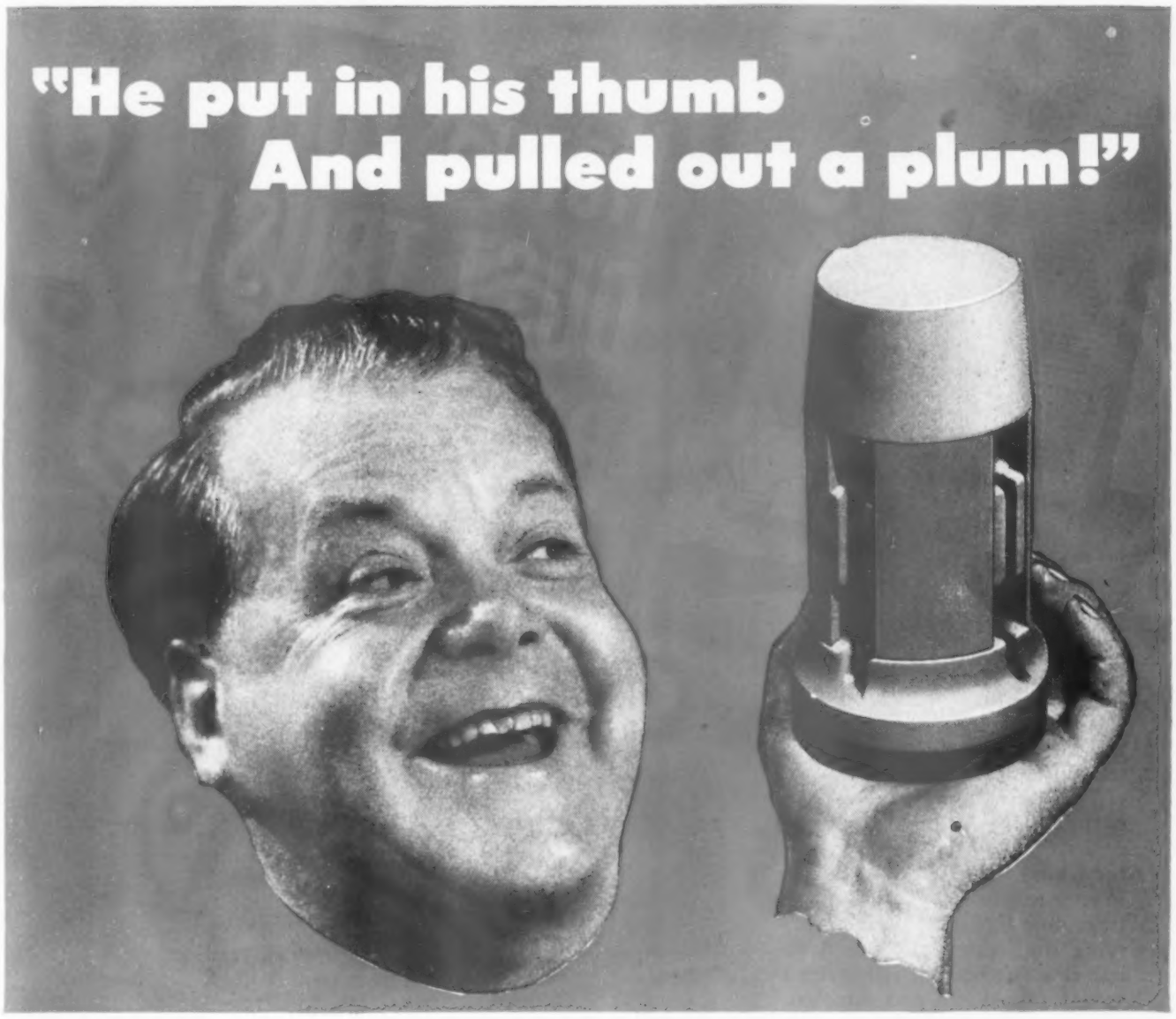
VELSICOL Corporation

Manufacturers of Coresin Core Oils • Aromatic Solvents • Synthetic Resins • Insecticides

GENERAL OFFICES: 120 East Pearson Street • Chicago 11, Illinois

The Foundries Materials Co., Coldwater, Mich. . . . Midwest Foundry Supply Co., Edwardsville, Ill. . . . Foundry Supply Co., Inc., St. Paul 4, Minn. . . . H. S. Stoller & Co., Akron, Ohio . . . Manufacturers' Equipment & Supply Co., Chattanooga 2, Tenn. . . . Wilson Company, Cambridge 42, Mass.

"He put in his thumb And pulled out a plum!"



"THAT'S what I call a whiz-dinger! Cores like this just don't *happen*. They have to be planned — carefully — if you want to make your core room costs stay in bounds. You've got to have the proper ingredients all the way through to get the production you want from your core department. I pay close attention to the cereal binders going into the mix, because a lot depends on binder performance. I guess you'd call me a Krause fan; I've been using Krause cereal binders for a long time now."

Krause cereal binders contribute a lot to good coremaking. They mix easily, supply ample green strength, insure better permeability, shorten shakeout time and increase core production generally. On your next order, ask for Krause cereal binders — *Truscor*, if you like it lightweight; or, *Amerikor*, if you prefer heavyweight. You'll see a noticeable improvement in your production of smooth, sharp cores. Should you have a perplexing coremaking problem, phone, wire, or write us the details. We'll be glad to help you master it.

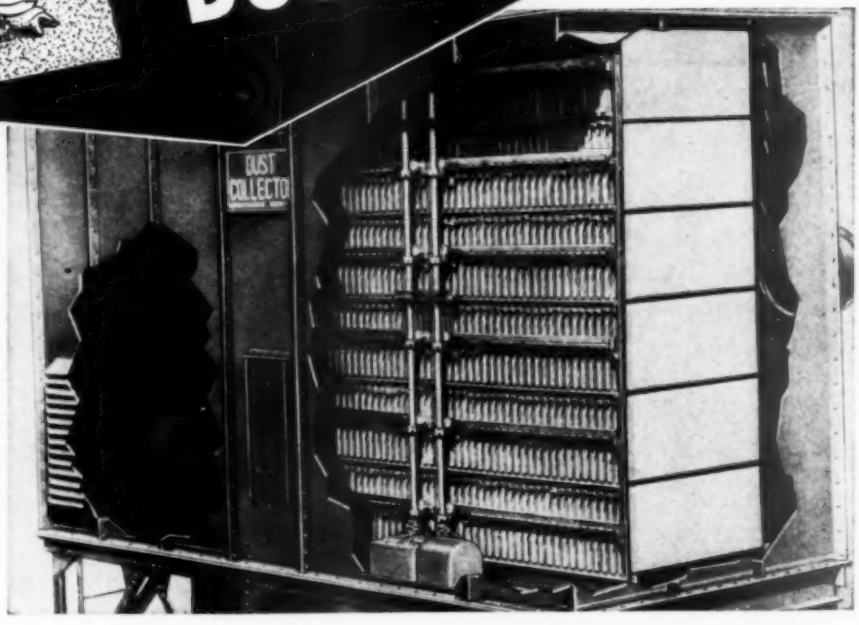
CHAS. A. KRAUSE MILLING CO., Milwaukee 1, Wis. • ***World's Largest Millers of Dry Corn***

CEREAL BINDERS

DISTRIBUTORS

M. A. Bell Co., St. Louis 2, Mo.
A. L. Cavedo & Son, Inc. Richmond 21, Va.
Foundry Supplies Co., Chicago 16, Ill.
J. H. Hatten, Lansdowne, Pa.
Independent Foundry Supply Co., Los Angeles 11, Calif.
Marthens & Co., Moline, Ill.
Carl F. Miller & Co., Seattle 4, Wash.
Milwaukee Chaplet & Mfg. Co., Milwaukee 4, Wis.
Pacific Graphite Works, Oakland 8, Calif.
Porter-Warner Chattanooga 2, Tenn.
Smith-Sharpe Co., Minneapolis 14, Minn.
Frederic B. Stevens, Inc., Buffalo 12, N. Y.
Frederic B. Stevens, Inc., Cleveland 14, Ohio
Frederic B. Stevens, Inc., Detroit 26, Mich.
Western Industrial Supply Co. 208 S. E. Hawthorne Blvd. Portland 14, Oregon

Here's Your DUST TRUST BUSTER!



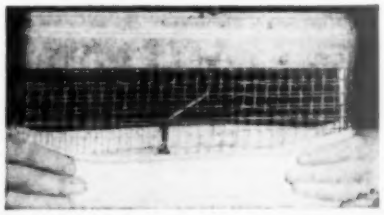
IT'S the Pangborn Dust Control System—with the exclusive features that put a positive end to the excessive prices you pay for unwanted dust.

The "CH" Collector is the heart of the system. As dust-laden air is drawn (or pushed) into the collector, it hits a baffle plate, its velocity is retarded, and the heavier particles drop into a hopper. Air carrying the lighter particles flows into channels beside cloth-covered screens placed in a grid partition. As the air passes through the screens, it deposits the remaining dust on the cloth and emerges dust-free.

CLOTH CAN'T COLLAPSE

One of many exclusive features is the all-steel, rust-proof wire mesh frame (electrically grounded) which uniformly supports the cloth and positively prevents collapse under air load. The supports are close together and the wire mesh is securely fastened and reinforced—so there's no chance for the bag to sag, no chance for the sides to touch with resultant reduction in filtering area and increased resistance to air flow.

Send at once for free 28-page Bull. 909A, giving complete story on Pangborn equipment which has successfully solved dust problems in over 9000 installations. Address Pangborn, *world's largest manufacturer of dust control and blast cleaning equipment* at 300 Pangborn Boulevard, Hagerstown, Maryland.



Cloth bag fits over wire mesh screen frame. Crank-shaped beater rod cleans cloth by alternately rapping opposite wire mesh surfaces (without touching cloth itself).

Pangborn
DUST CONTROL
PANGBORN CORPORATION, HAGERSTOWN, MARYLAND

TURNS DUST LOSSES INTO PROFITS

Whatever the method of casting—sand, permanent mold, or die casting—you're sure to agree on this basic fact: it takes good ingot to make good castings. That's why the Apex research department constantly works to make better alloys . . . why so many successful foundries always order Apex Ingot—proved best in every test from Ingot to Casting!

Apex Smelting Company

2537 WEST TAYLOR STREET, CHICAGO 12, ILLINOIS

OPERATION: Can Manufacturing

HEATING APPLICATIONS:
- Joint Preheating
- Seam Soldering
- Enamel Coating
- Lithograph Drying

FUEL: GAS

Enamel-coated tinplate emerging from drying oven

American Can Company Plant, Brooklyn, N. Y.

The productive flames of GAS perform essential functions in the manufacture of cans for the foods and beverages packaged by the giant canning industry.

American Can Company's trademark is a familiar sight on the grocery shelf because so many of the best foods are preserved in CANCO cans. As a leading producer, American Can Company has developed streamlined equipment in which heat is a production tool and the heat source is GAS, the invariable choice of design engineers who require fuel flexibility.

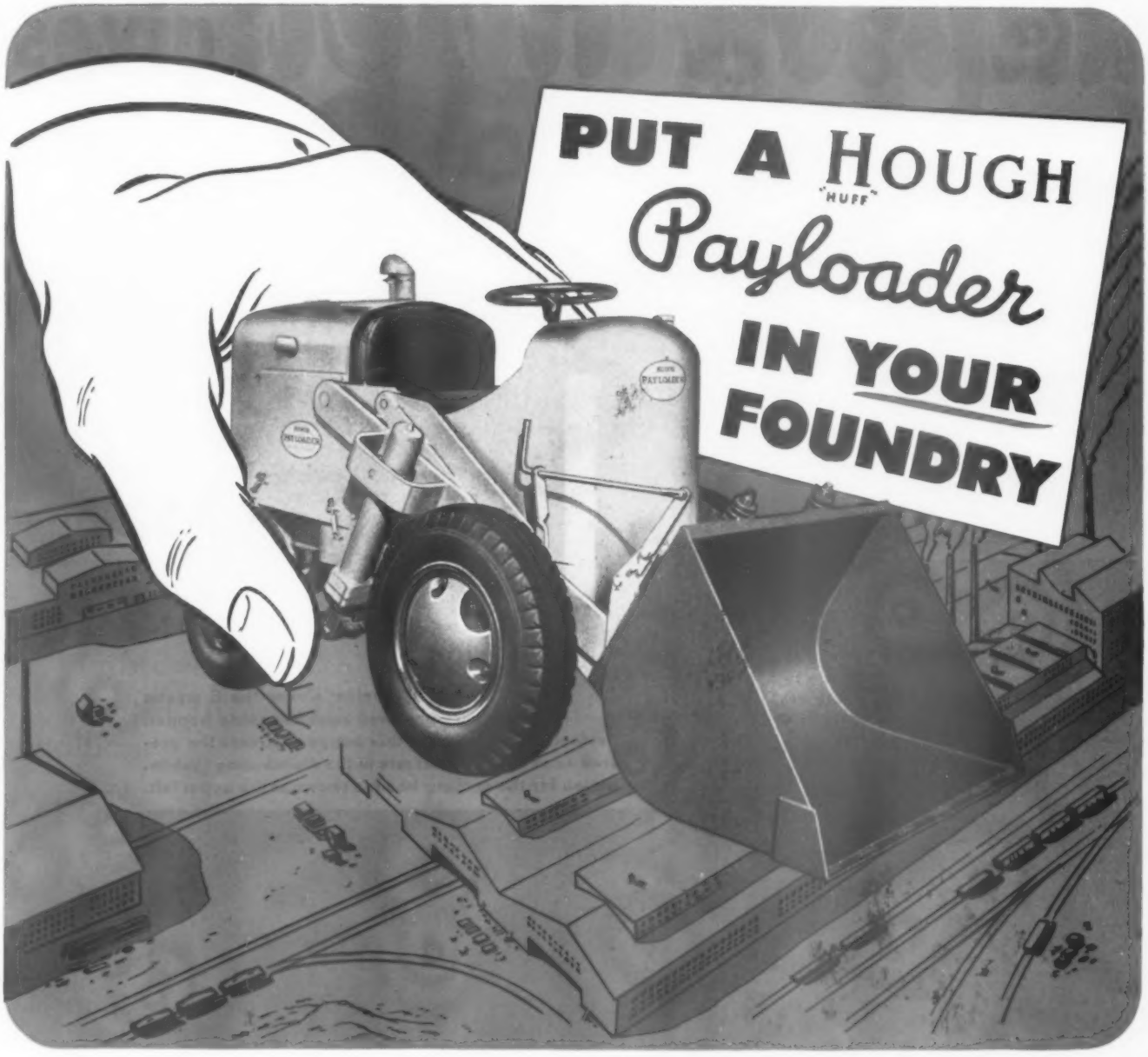
For lithograph ovens where uniform temperatures are essential to maintain color tones, in body-making machines where the joint-seal requires pre-heating and solder-melting, in the tunnel ovens for enamel-drying, the remarkably precise controllability of modern GAS equipment is amply evident.

Labor-saving automatic controls, clean and pleasant working conditions, availability and dependability of supply make GAS the preferred fuel for all process heating. Your local Gas Company will recommend methods for applying GAS to your industrial processes.

MORE AND MORE...
THE TREND IS TO GAS
FOR ALL INDUSTRIAL HEATING

AMERICAN GAS ASSOCIATION

420 LEXINGTON AVENUE, NEW YORK 17, N. Y.



Hundreds of foundries throughout the nation are depending on Hough Payloaders for handling core and moulding sand, mixing, clean-up work — supplying sand to moulders — charging storage bins and scores of other jobs formerly requiring large crews of costly hand labor. The Model H-A Payloader (10½ cu. ft. Bucket) is ideal for foundries — small and compact, it fits through narrow aisles and doorways, maneuvers easily in congested quarters — digs, loads, carries and dumps materials exactly where needed.

Hough Payloaders are soundly engineered, based on over a quarter century of material handling experience and backed by a world-wide distributor organization. Send for complete details on the H-A and 1 yd. HL, today.

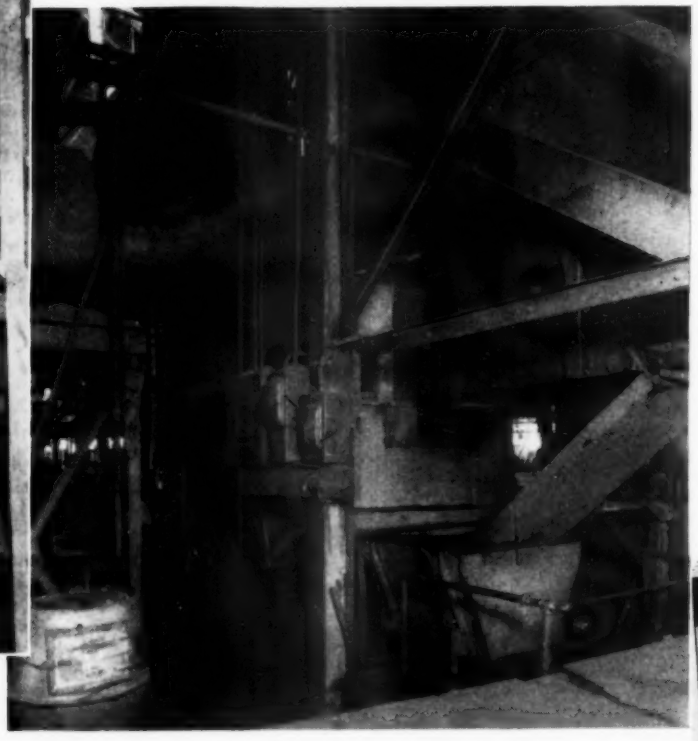
SEND for Catalog No. 162 for complete details on the H-A Payloader

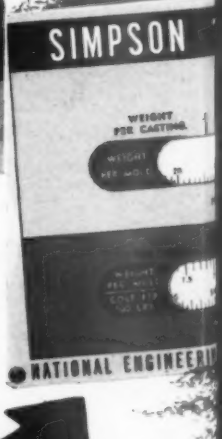
THE FRANK G. HOUGH CO.
MATERIAL HANDLING EQUIPMENT SINCE 1920
703 SUNNYSIDE AVE. LIBERTYVILLE, ILLINOIS

Simpson Mixer gives ...reports

Photo below shows the Simpson Mixer with prepared sand receiving hopper. The feeder belt beneath this hopper delivers the prepared sand at a constant rate to the distributing system. The fan for the cooling hood is shown at the upper left.

Photo above shows the Simpson Mixer in the background; the Timemaster automatic control is shown on the panel to the left. At the right is shown the hopper containing bonding material which is automatically measured into the mixer by means of a vibrating feeder. This mixer is equipped with a National cooling hood insuring delivery of cool, workable sand to the molders. The exhaust duct is shown at the top of the mixer.





NEW—The new Simpson Molding Cost Calculator shown at the right is a handy tool for foundrymen. With it, one can almost instantly compute the molding cost per ton of good castings, the number of molds to be made to produce a certain number of good castings, how many pounds of iron will be needed to pour off the remaining molds on a floor, and the cubic content of the mold. This Calculator is free to foundrymen. Write for yours.

them 5 important advantages!

Frank Foundries Corporation, Muncie, Indiana

1,2,3,4,5-read em!

1 They now use no facing on the castings, saving the very considerable additional labor of preparing and distributing the facing, and also the extra operation on the part of the molder.

2 The quality of the castings has been improved and the loss reduced because of improved sand condition.

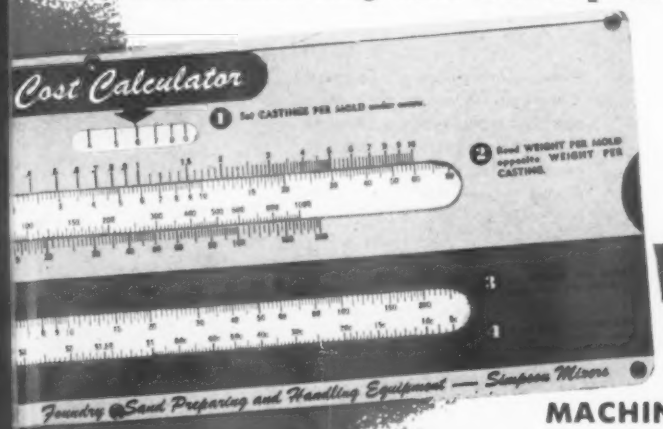
3 Cleaning costs have been reduced very considerably because of the improved quality of the castings.

4 The cost of new sand and bonding material has been cut to a fraction of the former amount because of the ability of the Simpson Mixer to obtain the utmost value of the bonding material. The strength of the sand as it came from the old conditioning unit was 5 pounds G. S. After the same sand, with no addition of bonding material, had been mulled in the Simpson Mixer the strength was 9.4 pounds.

5 Before, molders were always short of sand even though the backing sand was supplemented by facing sand. Now the No. 3 Mixer not only supplies all the sand for the molders on the mechanical molding unit, but also supplies sand for the side-floor molders as well.

●

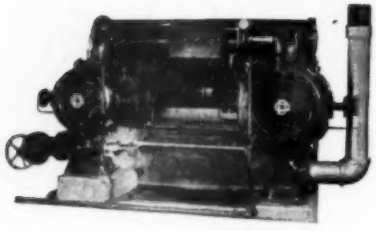
The No. 3 Simpson Mixer and National Auxiliary Equipment, were installed over a week end so that production was not stopped. The outstanding results from the use of the Simpson Mixer (as listed above) are indicative of the advantages that all types of foundries obtain with Simpson Mixers. Why not have a National Engineer call and tell you how you too can use a Simpson for better, lower cost sand conditioning in your plant.



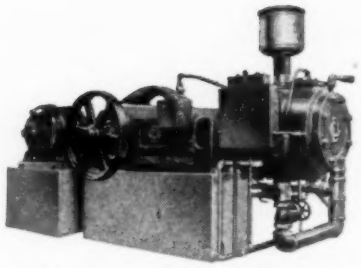
NATIONAL ENGINEERING COMPANY

MACHINERY HALL BUILDING • CHICAGO 6, ILLINOIS

Manufacturers and Selling Agents for Continental European Countries—The George Fischer Steel & Iron Works, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia—August's Limited, Halifax, England. For Canada—Dominion Engineering Co., Ltd., Montreal, Canada. For Australia and New Zealand—Gibson, Battle & Co., Pty., Ltd. Sydney, Australia



The air cylinders in this Gardner-Denver "HA" Horizontal Compressor are especially designed for highest volumetric efficiency and lowest horsepower requirements. Its duoplate valves are cushioned for high delivery capacity, high compression efficiency and lowest power consumption. The class "HA" compressors are available in capacities from 316 to 2012 cubic feet displacement per minute.



Is dust a problem in your plant? This Gardner-Denver Class "RX" Horizontal Compressor is dustproof. And its special design permits complete water jacketing of all valves, air passages and cylinder heads to remove the heat of compression—increasing efficiency and cutting horsepower. The Class "RX" Horizontal Compressors are furnished in sizes from 89 to 1292 cubic feet displacement per minute.

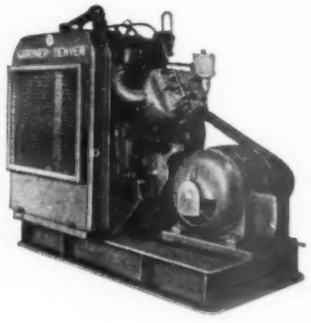
shopping for EXTRA *value?*

To get your money's worth in air compressors, centrifugal pumps or concrete breakers, look for the *special* features that help you do a better job at less cost. Every Gardner-Denver product on this page has such features—and we'll gladly give you complete information about any one of them. Write Gardner-Denver Company, Quincy, Illinois.

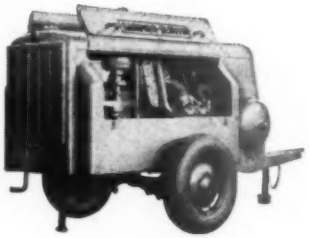
GARDNER-DENVER

SINCE 1859

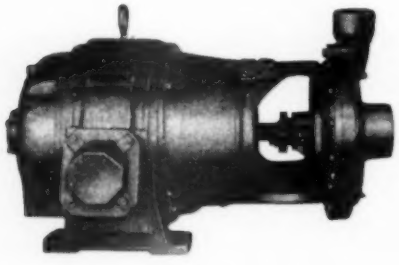
In this Class "WB" 2-stage Vertical Compressor, Gardner-Denver engineers departed from conventional air compressor design to give you more volumetric efficiency with greater capacity. "WB" Compressors—furnished in capacities from 142 to 445 cubic feet displacement per minute—have efficiencies comparable to those of large horizontal compressors.



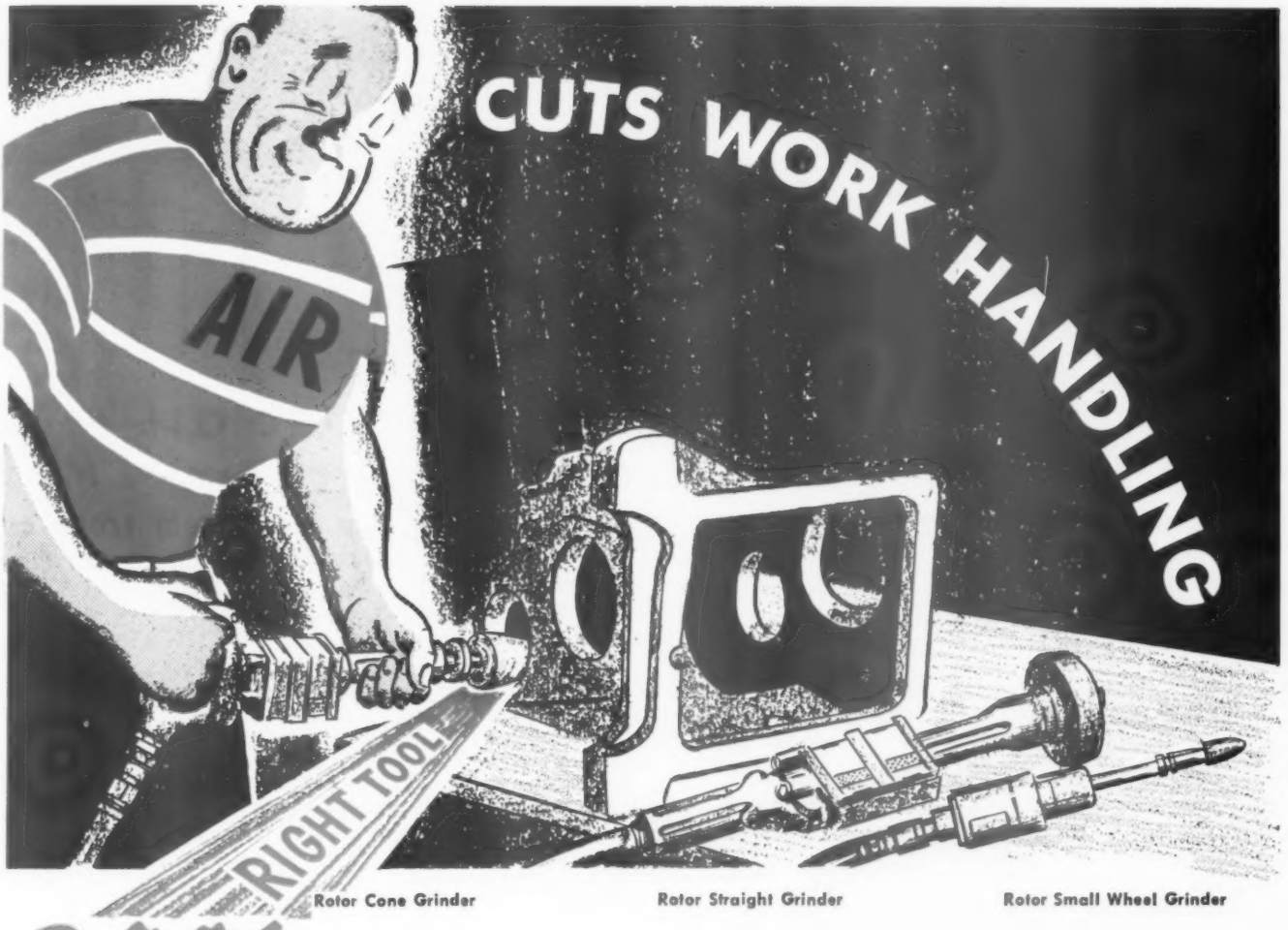
Here's a modern portable air compressor that's mighty handy to have around the plant! Complete water jacketing of its cylinders means dependable operation under constant load—cooler air—lubricating oil economy. Gardner-Denver "Portables" are furnished in sizes to suit every need.



In this Gardner-Denver Close Coupled Centrifugal, see how pump and motor are combined to form a complete, compact unit. These pumps can be installed in any position and are designed for capacities up to 250 gallons per minute, and heads up to 250 feet.



Plant alterations go forward more quickly when your men use this new Gardner-Denver Paving Breaker. The B87 is easier to handle than conventional types—and has a special safety latch which prevents air throttle from being opened when it is moved from place to place. Easily convertible to a sheeting driver.



Rotor Cone Grinder | Rotor Straight Grinder | Rotor Small Wheel Grinder

20% MORE OUTPUT WITH MULTIPLE TOOLING

This gray iron foundry used three operators, each with a different type of grinder to clean different parts of transmission cases. As each man finished his job, the work was moved to the next man. Too much time was required for moving . . . not enough time for grinding.

The Rotor Application Engineer suggested equipping each operator with three tools—(1) a 6,000 R.P.M. grinder with 6″ wheel, (2) an 8,500 R.P.M. grinder with 2¾″ cone wheel, (3) a 17,000 R.P.M. small wheel grinder—and suggested each operator do all the grinding on each casting, thereby eliminating the moving operations and speeding the grinding output. Results:

Production was increased more than 20% due to more grinding time and less handling time per working hour.

Additional tools paid for themselves in less than 6 months out of savings in cleaning costs.

Perhaps this multiple tooling idea can be applied to your operations. The Rotor Application Engineer is at your service to show you how to get greater output per man per dollar.

Yours for faster grinding,

AIR O'TOOL

OLGA SAN JUAN
Paramount's lovely Latin makes songs and dances sizzle in Irving Berlin's Technicolor musical, "Blue Skies."

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SMITH L-O CORE OIL *plus* Practical Foundry Service Men *Is a team that whips core room troubles*

Using a flexible uniform quality core oil in place of a less efficient binder can mean the difference between a continuous streamline operation and a bogged-down production.

Smith L-O Core Oil . . . time-tested and used consistently by many nationally-known jobbing and production foundries . . . is noted for its adaptability to jobbing work. Then, too, its constant uniformity makes it most dependable for mass production operation. When using L-O Core Oil you'll find that it, (1) is faster drying, (2) produces less gas and smoke during pouring operations, (3) provides quick collapsibility during shakeout operations.

Also, our competent staff of Practical Foundry Service Men can give you assistance whenever you are confronted with a new core making problem. They can recommend the proper mix ratio for best results, and will volunteer other suggestions pertinent to your core room production. Feel free to ask for this advisory service at anytime.

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CORE WASH ROD DIP LIQUID PARTING

Smith L-O *Core Oil*

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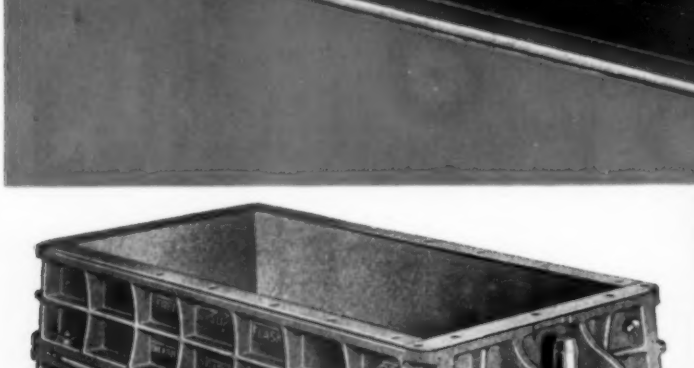

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Fremont, Ohio

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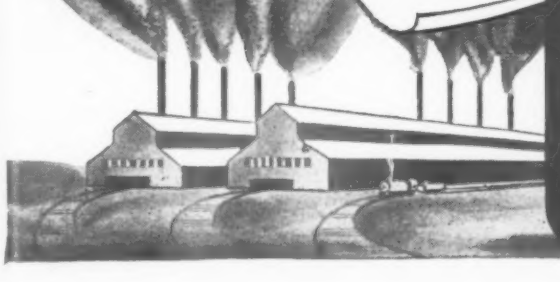

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The experience of hundreds of satisfied users proves that G-E X-Ray Industrial Units can be relied upon to pay real dividends—both scientific and economic.

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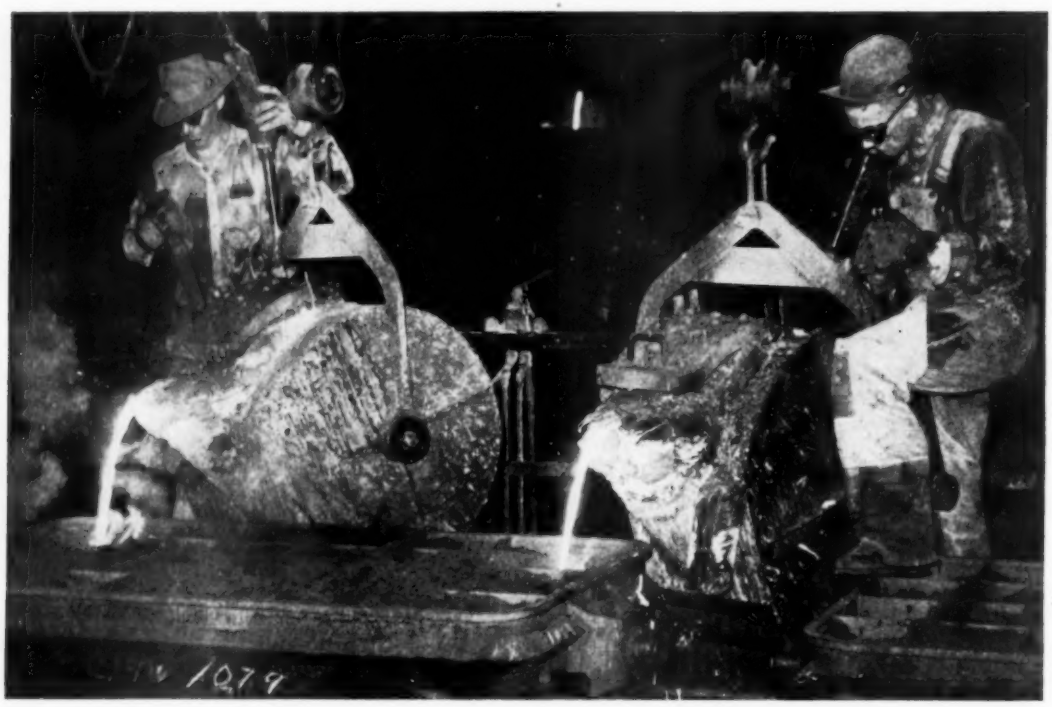

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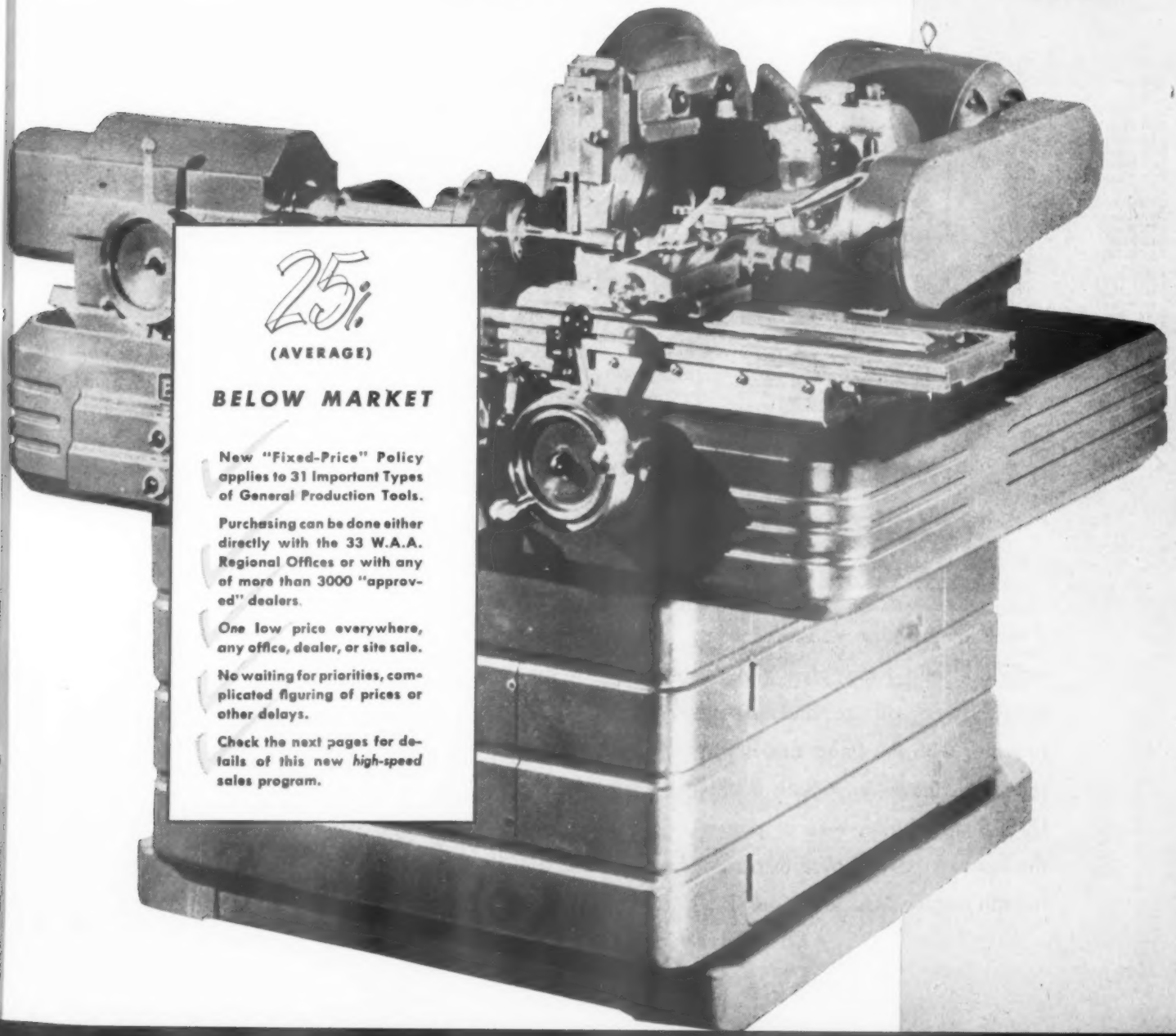

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New "Fixed-Price" Policy applies to 31 Important Types of General Production Tools.

Purchasing can be done either directly with the 33 W.A.A. Regional Offices or with any of more than 3000 "approved" dealers.

One low price everywhere, any office, dealer, or site sale.

No waiting for priorities, complicated figuring of prices or other delays.

Check the next pages for details of this new *high-speed* sales program.

BORING MACHINE — HORIZONTAL, PRECISION, BRIDGE TYPE, SINGLE END

Manufacturer: **EX-CELL-O CORPORATION, DETROIT, MICH.**

MODEL	SIZE AND CAPACITY	SALES PRICE
2112-A Single End	6" diameter bore, x 12" table travel	$ 720.00
2112-A Single End	6" diameter bore, x 15" table travel	655.00
112-C Single End	8" diameter bore, x 16" table travel	1036.00
112-C Single End	8" diameter bore, x 20" table travel	1139.00
Manufacturer: **THE HEALD MACHINE COMPANY, WORCESTER, MASS.**		
45 Bore-Matic, Standard, Single End	12" diameter bore, x 16" table travel	$ 1993.00
46-B Bore-Matic, Standard, Single End	9" diameter bore, x 14" table travel	1451.00
47-A Bore-Matic, Standard, Single End	9" diameter bore, x 13-5/8" table travel	1178.00
47-A Bore-Matic, Special, Single End	9" diameter bore, x 15" table travel	1186.00
48 Bore-Matic, Single End	6" diameter bore, x 9" table travel	714.00
48-A Bore-Matic, Single End	6" diameter bore, x 12" table travel	714.00
49 Bore-Matic, Standard, Single End	6" diameter bore, x 12" table travel	1116.00
Manufacturer: **STOKERUNIT CORPORATION, MILWAUKEE, WIS.**		
Mod. 1 Horizontal Single End	4" diameter bore, x 9" table travel	354.00
Mod. 2-B Horizontal, Single End	8" diameter bore, x 15" table travel	444.00

DRILL PRESS — FLOOR TYPE SINGLE OR MULTIPLE SPINDLE

(EXCEPT 110 VOLT, SINGLE PHASE)

Manufacturer: **ALLEN—CHARLES C. ALLEN CO., BARRE, MASS.**

MODEL	SIZE AND CAPACITY	SALES PRICE
HMD—Super Speed (Floor	5/16" drill capacity, 16" swing, 3 spindle	$ 511.00
HMD—Super Speed (Floor)	5/16" drill capacity, 16" swing, 4 spindle	657.00
HMD—Super Speed (Floor)	5/16" drill capacity, 16" swing, 6 spindle	$ 948.00
HMD—Super Speed (Floor)	5/16" drill capacity, 24" swing, 1 spindle	229.00
HMD—Super Speed (Floor)	5/16" drill capacity, 24" swing, 2 spindle	382.00
HMD—Super Speed (Floor)	5/16" drill capacity, 24" swing, 3 spindle	535.00
2-KH (Floor)	5/8" drill capacity, 14" swing, 1 spindle	$ 177.00
2-KH (Floor)	5/8" drill capacity, 14" swing, 2 spindle	279.00
2-KH (Floor)	5/8" drill capacity, 14" swing, 3 spindle	381.00
2-KH (Floor)	5/8" drill capacity, 14" swing, 4 spindle	483.00
2-KH (Floor)	5/8" drill capacity, 14" swing, 6 spindle	687.00
2-KH (Floor)	5/8" drill capacity, 24" swing, 1 spindle	$ 185.00
2-KH (Floor)	5/8" drill capacity, 24" swing, 2 spindle	295.00
2-KH (Floor)	5/8" drill capacity, 24" swing, 3 spindle	394.00
2-KH (Floor)	5/8" drill capacity, 24" swing, 4 spindle	513.00
2-KH (Floor)	5/8" drill capacity, 24" swing, 6 spindle	732.00
2-MSV (Floor)	7/8" drill capacity, 16" swing, 1 spindle	$ 240.00
2-MS (Floor)	7/8" drill capacity, 16" swing, 2 spindle	449.00
2-MS (Floor)	7/8" drill capacity, 24" swing, 2 spindle	469.00
2-MS (Floor)	7/8" drill capacity, 24" swing, 4 spindle	910.00
2-MS (Floor)	7/8" drill capacity, 30" swing, 3 spindle	718.00
2-V Belted (Floor)	7/8" drill capacity, 16" swing, 1 spindle	$ 184.00
2-V Belted (Floor)	7/8" drill capacity, 16" swing, 2 spindle	266.00
2-V Belted (Floor)	7/8" drill capacity, 16" swing, 4 spindle	440.00
2-V Belted (Floor)	7/8" drill capacity, 24" swing, 3 spindle	382.00
2-V Belted (Floor)	7/8" drill capacity, 30" swing, 1 spindle	196.00
2-1/2 MSV (Floor)	1-1/8" drill capacity, 16" swing, 2 spindle	$ 449.00
2-1/2 MSV (Floor)	1-1/8" drill capacity, 16" swing, 4 spindle	810.00
2-1/2 MSV (Floor)	1-1/8" drill capacity, 16" swing, 6 spindle	1171.00
2-1/2 MSV (Floor)	1-1/8" drill capacity, 24" swing, 1 spindle	281.00
2-1/2 MSV (Floor)	1-1/8" drill capacity, 24" swing, 2 spindle	469.00
2-1/2 MSV (Floor)	1-1/8" drill capacity, 24" swing, 4 spindle	845.00
2-1/2 MSV (Floor)	1-1/8" drill capacity, 24" swing, 5 spindle	1033.00
3-V Belted (Floor)	1-1/4" drill capacity, 24" swing, 1 spindle	268.00
3-V Belted (Floor)	1-1/4" drill capacity, 24" swing, 2 spindle	449.00
3-V Belted (Floor)	1-1/4" drill capacity, 24" swing, 3 spindle	632.00
Manufacturer: **AVEY DRILLING MACHINE CO., CINCINNATI, OHIO**		
1-MA-6 Floor, Box Column	1/2" drill capacity, 15" swing, 1 spindle	$ 175.00
2-MA-6 Floor, Box Column	7/8" drill capacity, 15" swing, 1 spindle	243.00
2-MA-6 Floor, Box Column	7/8" drill capacity, 15" swing, 2 spindle	$ 448.00
2-MA-6 Floor, Box Column	7/8" drill capacity, 15" swing, 3 spindle	652.00
2-MA-6 Floor, Box Column	7/8" drill capacity, 15" swing, 4 spindle	856.00
2-MA-6 Floor, Box Column	7/8" drill capacity, 24" swing, 4 spindle	710.00
2-MA-6 Floor, Box Column	7/8" drill capacity, 24" swing, 5 spindle	877.00
2-MA-6 Floor, Box Column	7/8" drill capacity, 24" swing, 6 spindle	$ 1044.00
2-MA-6 Floor, Box Column	7/8" drill capacity, 30" swing, 3 spindle	729.00
No. 3 Belted, Floor, Box Column	1" drill capacity, 24" swing, 1 spindle	249.00
3-MA-6 Floor, Box Column	1-1/8" drill capacity, 24" swing, 6 spindle	2122.00
3-MA-6 Floor, Box Column	1-1/4" drill capacity, 24" swing, 1 spindle	390.00
3-MA-6 Floor, Box Column	1-1/4" drill capacity, 24" swing, 3 spindle	$ 1083.00
3-MA-6 Floor, Box Column	1-1/4" drill capacity, 24" swing, 6 spindle	2122.00
3-BMA-1 Floor, Box Column	1-1/4" drill capacity, 24" swing, 1 spindle	279.00
3-BMA-1 Floor, Box Column	1-1/4" drill capacity, 24" swing, 3 spindle	754.00
No. 3 Standard Floor, Box Column	1-1/4" drill capacity, 24" swing, 3 spindle	614.00
No. 3 Standard Floor, Box Column	1-1/4" drill capacity, 24" swing, 4 spindle	791.00
Manufacturer: **BUFFALO FORGE COMPANY, BUFFALO, N. Y.**		
Model 14 Pedestal, Box Column, "High-Speed"	1/2" drill capacity, 14" swing, 1 spindle	$ 120.00
Model 2, Floor, Box Column, "Motor Spindle"	7/8" drill capacity, 16" swing, 1 spindle	243.00
Model 2 Floor, Box Column, "Motor Spindle"	7/8" drill capacity, 26" swing, 1 spindle	266.00
Manufacturer: **CANEDY-OTTO MFG. CO., CHICAGO HEIGHTS, ILL.**		
No. 5000-FV Floor, Box Column	3/8" drill capacity, 16" swing, 1 spindle	$ 172.00
Manufacturer: **EDLUND MACHINERY CO., INC., CORTLAND, N. Y.**		
1-B-7" Floor Type	3/8" drill capacity, 14" swing, 1 spindle	$ 140.00
1-B-7" Floor Type	3/8" drill capacity, 14" swing, 2 spindle	239.00
1-B-7" Floor Type	3/8" drill capacity, 14" swing, 3 spindle	330.00
1-B-7" Floor Type	3/8" drill capacity, 14" swing, 4 spindle	391.00
1-B-7" Floor Type	3/8" drill capacity, 14" swing, 6 spindle	604.00
1-B-12" Floor Type	3/8" drill capacity, 24" swing, 1 spindle	$ 152.00
1-B-12" Floor Type	3/8" drill capacity, 24" swing, 3 spindle	348.00
1-B-12" Floor Type	3/8" drill capacity, 24" swing, 4 spindle	411.00
2-B- 8" Floor Type	3/4" drill capacity, 16" swing, 1 spindle	195.00
2-B- 8" Floor Type	3/4" drill capacity, 16" swing, 2 spindle	356.00
2-B- 8" Floor Type	3/4" drill capacity, 16" swing, 3 spindle	$ 524.00
2-B- 8" Floor Type	3/4" drill capacity, 16" swing, 4 spindle	691.00
2-B- 8" Floor Type	3/4" drill capacity, 16" swing, 6 spindle	1025.00
3-B-12" Floor Type	3/4" drill capacity, 24" swing, 1 spindle	208.00
3-B-12" Floor Type	3/4" drill capacity, 24" swing, 2 spindle	378.00
3-B-12" Floor Type	3/4" drill capacity, 24" swing, 3 spindle	$ 588.00
3-B-12" Floor Type	3/4" drill capacity, 24" swing, 4 spindle	775.00
3-B-12" Floor Type	3/4" drill capacity, 24" swing, 6 spindle	1019.00
2-MS-12" Floor Type	3/4" drill capacity, 30" swing, 2 spindle	468.00
4-B-12" Floor Type	1" drill capacity, 24" swing, 1 spindle	293.00

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If tools of the type you need are included send today for WAA's catalog giving all sizes and models together with the fixed prices for purchases made anywhere in the U. S. Simply write, wire or phone the nearest WAA office listed on the 4th page of this advertisement.

- Boring Machine—Horizontal, Precision, Bridge Type, Single and Double End
- Chucking Machine—Automatic, Vertical, Multiple Spindle Type
- Chucking Machine—Single Spindle Automatic, Horizontal Turret Type Machine
- Chucking Machine—Six Spindle Automatic, Horizontal
- Drilling Machine or Drill Press—Bench or Floor, Single or Multiple Spindle
- Gear Cutting Machine for Straight Bevel Gears, (Not Planer Type)
- Gear Hobber—Horizontal
- Gear Hobber—Vertical, Universal
- Gear Shaper—For External Spur Gears Only
- Gear Shaper—For Spur Gears, External or Internal
- Gear Shaper—For Spur and Helical Gears, External and Internal
- Gear Tooth Shaver—For External and Internal Gears (Rotary Type Machine)
- Gear Tooth Grinder—Generating Type, for Spur and Helical Gears
- Gear Tooth Grinder—For Spur Gears, External and Internal (Formed Wheel Type Machine)
- Grinders—Centerless
- Grinder—Crank Pin Grinders
- Grinders—Plain External Cylindrical Grinder
- Grinder—Internal, Cylindrical, Automatic Sizing
- Grinder—Internal Cylindrical (Hydraulic Feed Machine)
- Grinder—Internal Cylindrical, Hydraulic Feed, for Hole and Face Grinding.
- Grinder—Surface, Rotary Table Type
- Lathe—Multiple Tool, Not Automatic, Manufacturing Type Production Lathe
- Milling Machine—Automatic and Manufacturing Knee Type
- Milling Machine—Plain Bed Type, Horizontal Spindle Machines
- Milling Machine—Vertical, Knee Type (Not Including Bench Type)
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- Thread Milling Machine
- Turret Lathe—Ram Type, Plain and Universal

ALL TOOLS SUBJECT TO PRIOR SALE

Manufacturer: FOOTE-BURT COMPANY, CLEVELAND, OHIO

Mod. DE-1 Floor, Box Column	3/16" drill capacity, 14" swing, 1 spindle	$ 127.00
Mod. 2 Floor, Box Column	7/8" drill capacity, 16" swing, 1 spindle	147.00
Mod. 2 Floor, Box Column	7/8" drill capacity, 16" swing, 2 spindle	255.00
Mod. 2 Floor, Box Column	7/8" drill capacity, 16" swing, 6 spindle	$ 706.00
Mod. 2 Floor, Box Column	7/8" drill capacity, 24" swing, 1 spindle	156.00
Mod. 2 Floor, Box Column	7/8" drill capacity, 24" swing, 2 spindle	274.00
Mod. 2 Floor, Box Column	7/8" drill capacity, 24" swing, 3 spindle	$ 391.00
Mod. 2 Floor, Box Column	7/8" drill capacity, 24" swing, 4 spindle	510.00
Mod. 2 Floor, Box Column	7/8" drill capacity, 24" swing, 6 spindle	745.00
Mod. 3 Floor, Box Column	1-1/4" drill capacity, 24" swing, 1 spindle	$ 279.00

Manufacturer: THE FOSDICK MACHINE TOOL CO., CINCINNATI, OHIO

No. 4 Floor, Box Column	7/8" drill capacity, 24" swing, 1 spindle	$ 255.00
No. 4 Floor, Box Column	7/8" drill capacity, 24" swing, 3 spindle	601.00
No. 4 Floor, Box Column	7/8" drill capacity, 24" swing, 4 spindle	793.00
No. 4 B. M. Floor, Box Column	1" drill capacity, 16" swing, 1 spindle	$ 293.00
No. 4 B. M. Floor, Box Column	1" drill capacity, 16" swing, 2 spindle	293.00
No. 4 B. M. Floor, Box Column	1" drill capacity, 24" swing, 1 spindle	307.00
No. 4 B. M. Floor, Box Column	1" drill capacity, 24" swing, 4 spindle	1009.00
No. 5 B. M. Floor, Box Column	1-1/2" drill capacity, 24" swing, 1 spindle	$ 722.00
No. 5 B. M. Floor, Box Column	1-1/2" drill capacity, 24" swing, 2 spindle	790.00
No. 5 B. M. Floor, Box Column	1-1/2" drill capacity, 24" swing, 6 spindle	2219.00

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Manufacturer: LELAND GIFFORD COMPANY, WORCESTER, MASS.

No. 1-LMS Floor, Motor Spindle	3/8" drill capacity, 12" swing, 1 spindle	$ 156.00
No. 1-LMS Floor, Motor Spindle	3/8" drill capacity, 12" swing, 2 spindle	274.00
No. 1-LMS Floor, Motor Spindle	3/8" drill capacity, 12" swing, 3 spindle	414.00
No. 1-LMS Bench, Motor Spindle	3/8" drill capacity, 20" swing, 1 spindle	147.00
No. 1-LMS Bench, Motor Spindle	3/8" drill capacity, 20" swing, 4 spindle	527.00
No. 1-LMS Floor, Motor Spindle	3/8" drill capacity, 20" swing, 1 spindle	168.00
No. 1-LMS Floor, Motor Spindle	3/8" drill capacity, 20" swing, 2 spindle	$ 308.00
No. 1-LMS Floor, Motor Spindle	3/8" drill capacity, 20" swing, 3 spindle	449.00
No. 2-LMS Floor, Motor Spindle	7/8" drill capacity, 14" swing, 1 spindle	275.00
No. 2-LMS Floor, Motor Spindle	7/8" drill capacity, 14" swing, 2 spindle	475.00
No. 2-LMS Floor, Motor Spindle	7/8" drill capacity, 14" swing, 3 spindle	691.00
No. 2-LMS Floor, Motor Spindle	7/8" drill capacity, 14" swing, 4 spindle	$ 907.00
No. 2-LMS Floor, Motor Spindle	7/8" drill capacity, 14" swing, 5 spindle	1109.00
No. 2-LMS Floor, Motor Spindle	7/8" drill capacity, 14" swing, 6 spindle	1312.00
No. 2-LMS Floor, Motor Spindle	7/8" drill capacity, 20" swing, 1 spindle	285.00
No. 2-LMS Floor, Motor Spindle	7/8" drill capacity, 20" swing, 2 spindle	491.00
No. 2-LMS Floor, Motor Spindle	7/8" drill capacity, 20" swing, 3 spindle	$ 714.00
No. 2-LMS Floor, Motor Spindle	7/8" drill capacity, 20" swing, 4 spindle	935.00
No. 2-LMS Floor, Motor Spindle	7/8" drill capacity, 20" swing, 6 spindle	1349.00
No. 2-LMS Floor, Motor Spindle	7/8" drill capacity, 26" swing, 1 spindle	297.00
No. 2-LMS Floor, Motor Spindle	7/8" drill capacity, 26" swing, 2 spindle	514.00
No. 2-LMS Floor, Motor Spindle	7/8" drill capacity, 26" swing, 3 spindle	$ 731.00
No. 2-LMS Floor, Motor Spindle	7/8" drill capacity, 26" swing, 4 spindle	984.00
No. 2-LMS Floor, Motor Spindle	7/8" drill capacity, 26" swing, 5 spindle	1206.00
No. 2-LMS Floor, Motor Spindle	7/8" drill capacity, 26" swing, 6 spindle	1426.00
No. 3-MS Floor, Motor Spindle	1" drill capacity, 24" swing, 1 spindle	$ 427.00
No. 3-MS Floor, Motor Spindle	1" drill capacity, 24" swing, 2 spindle	780.00
No. 3-MS Floor, Motor Spindle	1" drill capacity, 24" swing, 3 spindle	1154.00

Manufacturer: THE TAYLOR AND FENN COMPANY, HARTFORD, CONN.

Mod. S Floor, Box Column	3/8" drill capacity, 16" swing, 6 spindle	$ 477.00

Manufacturer: THE TOLEDO GENERAL MFG. CO., TOLEDO, OHIO

Model KTV Floor, Box Column	7/8" drill capacity, 24" swing, 4 spindle	$ 155.00

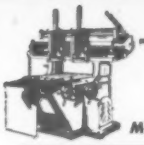
GRINDER — INTERNAL CYLINDRICAL, (HYDRAULIC FEED MACHINE)

Manufacturer: BRYANT CHUCKING GRINDER CO., SPRINGFIELD, VT.

MODEL AND DESCRIPTION	SIZE AND CAPACITY	SALES PRICE
Model 16-16 Internal Grinder, Hydraulic Feed	16" swing x 13" stroke	$1475.00
Model 16-22 Internal Grinder, Hydraulic Feed	22" swing x 13" stroke	1668.00
Model 16C-16 Internal Grinder, Hydraulic Feed	16" swing x 13" stroke	1647.00
Model 16F-28 Internal Grinder, Hydraulic Feed	28" swing x 13" stroke	$1766.00
Model 24-26 Internal Grinder, Hydraulic Feed	26" swing x 18" stroke	2051.00
Model 24-36 Internal Grinder, Hydraulic Feed	36" swing x 16" stroke	2427.00
Model 24L-26 Internal Grinder, Hydraulic Feed	26" swing x 24" stroke	$2589.00
Model 112M Internal Grinder, Hydraulic Feed	16" swing x 9" stroke	2292.00
Model 16-36 Internal Grinder, Gap Bed	36" swing x 9" stroke	1800.00

Manufacturer: THE HEALD MACHINE COMPANY, WORCESTER, MASS.

Model 81 Plain Chucker, Internal Grinder, Hydraulic Feed	9" swing x 3" stroke	$1122.00
Model 72-A-3 Plain Chucker, Internal Grinder, Hydraulic Feed	11-1/2" swing x 12" stroke	1327.00
Model 72-A-5 Plain Chucker, Internal Grinder, Hydraulic Feed	11-1/2" swing x 20-5/8" str.	1415.00
Model 74 Plain Chucker, Internal Grinder, Hydraulic Feed	24" swing x 15" stroke	$1940.00
Model 172, Gap, Plain, Internal Grinder, Hydraulic Feed	36" swing x 13" stroke	1778.00



PROFILING MACHINE — VERTICAL, FIXED BED TYPE, SINGLE AND MULTIPLE SPINDLE

Manufacturer: THE FREW MACHINE COMPANY, PHILADELPHIA, PA.

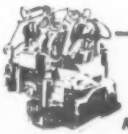
MODEL AND DESCRIPTION	SIZE	SALES PRICE
No. 6-A Single Spindle	24" x 36" table size	$ 793.00

Manufacturer: MOREY MACHINERY COMPANY, INC., NEW YORK, N. Y.

No. 12-M Single Spindle	23" table travel	$ 705.00
No. 12-M Two Spindle	23" table travel	742.00

Manufacturer: PRATT AND WHITNEY DIVISION, HARTFORD, CONN.

No. M-1693 Single Spindle, No. 12-B	20" table travel	$ 731.00
No. M-1693 Two Spindle, No. 12-B	20" table travel	844.00
No. M-1482 Single Spindle	32" table travel	1675.00



GEAR TOOTH GRINDER — GENERATING TYPE, FOR SPUR AND HELICAL GEARS

Manufacturer: THE FELLOWS GEAR SHAPER CO., SPRINGFIELD, VT.

MODEL AND DESCRIPTION	SIZE AND CAPACITY	SALES PRICE
No. 12 Spur and Helical, External only	12" pitch diameter x 1-1/2" face width	$ 1117.00

Manufacturer: PRATT AND WHITNEY DIVISION, HARTFORD, CONN.

M-1635 Spur	10- 1/4" pitch diameter x 6" face width	$ 1791.00
M-1639 Helical	10-11/16" pitch diameter x 6" face width	2528.00
M-1679 Helical, Two Wheel	10-11/16" pitch diameter x 1-1/4" face width	3300.00
M-1838 Helical	18- 1/2" pitch diameter x 6" face width	4292.00

GOVERNMENT WAA SURPLUS

Sales to priority claimants, which include Federal Agencies, Certified Veterans, World War II, and subsequent priority claimants, will be made in proper sequence as required by law.

Exporters: Your business is solicited. If sales are conducted at various levels, you will be considered as a wholesaler. Any inquiries regarding export control should be referred to Office of International Trade, Department of Commerce, Washington, D. C.

. . . and no priorities needed

To make purchases visit any of the W.A.A. offices listed below; your regular machine tool dealer, or any W.A.A. Machine Tool Site Sale advertised in your local paper. You can arrange on the spot for immediate purchase. Remember, however, that the particular machine you want may be located elsewhere and shipping times these days are still uncertain. But you will *not* have to wait for lengthy clearances of priorities on nation-wide search of stocks. The machines *are* available for immediate sale.

W.A.A. announced last month its important New Price Policy on 31 types of General Production Tools.

But just as a reminder here is how W.A.A.'s new price has been set for a typical machine; Model 2K Kearney and Trecker Milling Machine, vertical knee type; W.A.A. S.C. Code 3417-23-20-28.

Price (New)	$7,054.00
Previous W.A.A. Sales Price (based on depreciation primarily)	4,091.00
Average Market Value	2,556.00
New W.A.A. Sales Price	2,045.00
Available for rebuilding	511.00

GOVERNMENT W A A SURPLUS

THERE IS A
WAA REGIONAL OFFICE
NEAR YOU

(starred offices have the longest and most complete inventories of surplus machine tools—but stocks are extensive in *all* offices. Watch your newspaper for special machine tool sales in your area).

Offices located at:

Atlanta	Helena	Omaha
Birmingham	Houston	*PHILADELPHIA
*BOSTON	Jacksonville	Portland, Ore.
Charlotte	Kansas City, Mo.	Richmond
*CHICAGO	Little Rock	Salt Lake City
Cincinnati	Los Angeles	*ST. LOUIS
*CLEVELAND	Louisville	San Antonio
Dallas	Minneapolis	San Francisco
Denver	Nashville	Seattle
*DETROIT	New Orleans	Spokane
Fort Worth	*NEW YORK	Tulsa

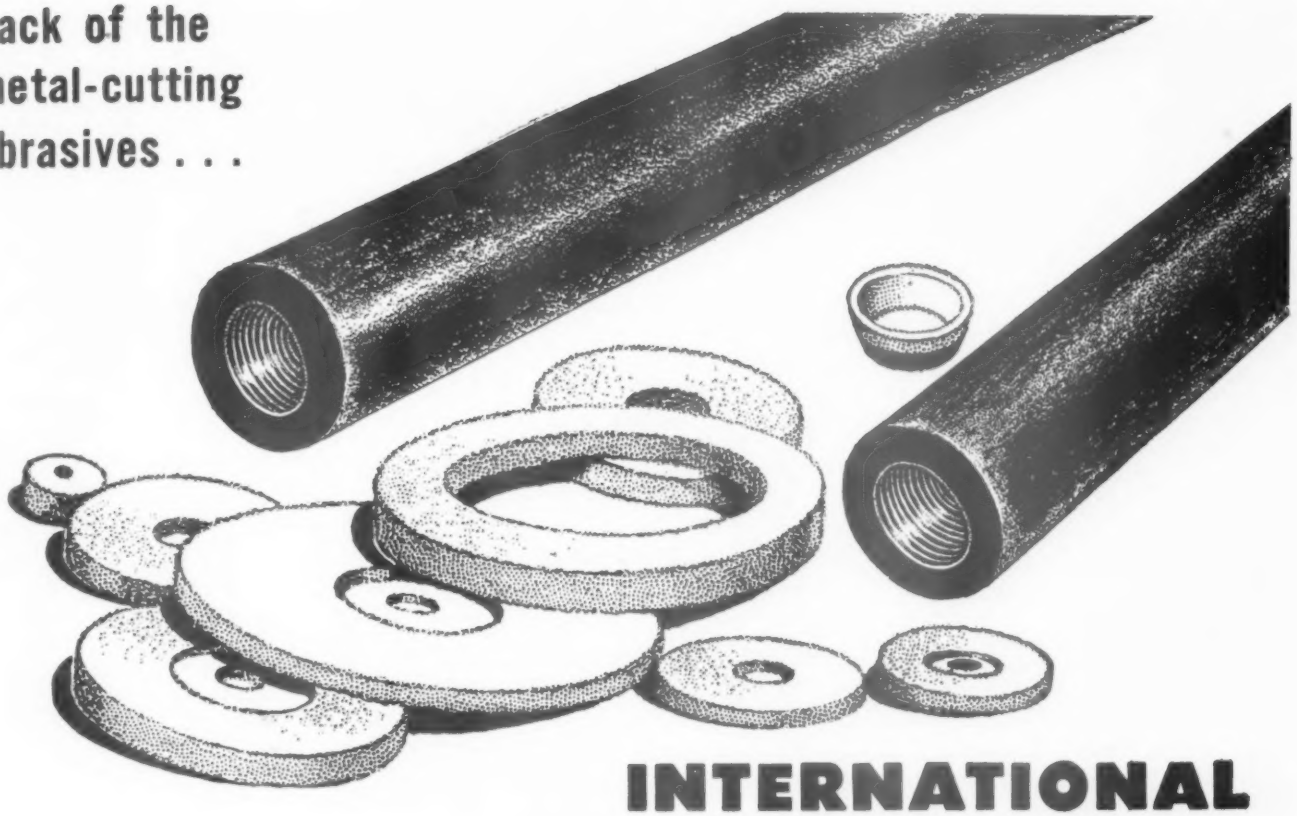
MACHINE TOOL
SALES DIVISION

686-2

WAR ASSETS ADMINISTRATION

GOVERNMENT OWNED SURPLUS

back of the metal-cutting abrasives . . .



INTERNATIONAL GRAPHITE ELECTRODES

WHEREVER you see hard, metal-cutting abrasives in action, you can be reasonably certain that International Graphite Electrodes had a part in their manufacture. For leading makers of abrasives—like producers of fine alloyed metals—have learned through long experience that fine quality control of product in electric furnaces calls for perfection in every production detail. Likewise these producers have proved to their own satisfaction in the severest tests of all—in actual furnace operation under a wide range of production requirements – that International Graphite Electrodes offer the physical, electrical, and chemical properties in the right combination for their exacting needs.

Check over the qualities *you* want in electric furnace electrodes—the properties you'd give them if you were *making* electrodes as well as *using* them. You'll find, too, that International Electrodes fully measure up to every exacting standard by which electrodes are judged.

For all-around satisfaction and economical performance, specify International the next time you buy electrodes; find out first-hand why they are so widely preferred by electric furnace operators. Write for details and prices today.

Specify INTERNATIONAL Graphite Electrodes for—Slow consumption—High current capacity—Low rate of oxidation—High thermal conductivity—High degree of purity—Consistently uniform properties and dimensions—Low cost per ton of production.

International Graphite & Electrode Corp.
SAINT MARYS, PA.

2284

ICE

NEW STAINLESS STEEL
COMBUSTION CHAMBER
INTRODUCED BY DRAVO
PITTSBURGH, PA.: Stainless steel, scientific development which aided the advancement of jet propulsion and turbo-supercharging is now being utilized to provide more efficient and durable combustion chambers in Dravo Counterflo Oil and Gas Fired Heaters. Effective immediately, industrial and commercial heating installations with Dravo Heaters

• In fabricating the combustion chamber of Dravo Heaters from stainless steel, many extra years of highly efficient operation have been added to the life of a direct fired heater that already has proved its worth in thousands of industrial and commercial installations.

The most vulnerable part of any heater is its combustion chamber. It is here that scale from high combustion temperatures first causes inefficiency and later failure. Stainless steel has high resistance to oxidation. This revolutionary application of high heat-resisting metal will not only prolong the life of the Dravo Heater, but will aid in maintaining its inherently high efficiency.

Other advantages gained in this important advancement include: **elimination of refractory with its troublesome maintenance; reduction of overall size and weight of heaters; more flexibility of application and over 100% greater safety factor against burning out when compared with carbon steel.**

These and other improvements make the Dravo Counterflo Oil or Gas Fired Heater the most efficient and durable heater of its type available today. Write for Bulletin AP 516 for details. Dravo Corporation, Heating Section, 300 Penn Avenue, Pittsburgh 22, Pa.

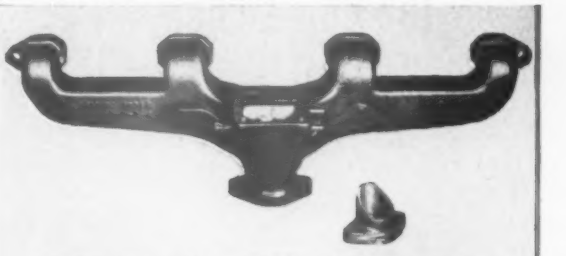
DRAVO

DRAVO CORPORATION

PITTSBURGH • WILMINGTON • PHILADELPHIA • WASHINGTON
NEW YORK • CLEVELAND • DETROIT

What... Remodel Iron Parts Already Cast?

Yes, right on the production line ...with NI-ROD



BEFORE: Here's the original cast iron manifold and the extra port. After inspection of both parts, the manifold was preheated to 450°F.

AFTER: Using a jig, the port was mounted at a 3½° angle and "spotted" in 3 places. A continuous weld then completed the job.

CLOSE-UP: A post heat to 450°F., slag removal and air cooling preceded the final step . . . boring of the port. Result: another success story for Ni-Rod.

Here's an interesting Ni-Rod case history . . .*

It shows how easily Ni-Rod can simplify design changes and speed production.

Grey iron manifolds like the one at the top became outmoded when an additional port was required.

But, quickly and easily, Candler-Hill Corporation, of Detroit, remodeled the manifolds on hand, using Ni-Rod.

Saving time, money and labor . . . this company cut a correctly located hole in each casting, then welded on a secondary port using an a.c. transformer-type welder drawing 160 amperes.

Since other rods gave less favorable results, Candler-Hill was particularly gratified with Ni-Rod. It speeded-up the process, required less preheat and post heat, and the machinability of the weld allowed quick boring of the port. Position of ports was held within ± ½°, and all other dimensions were held within ± .003".

Try a 5-lb. package of Ni-Rod. Use it on a.c. or d.c., and see how easy it is to get strong, sound, machinable welds in cast iron.

*Reg. U. S. Pat. Off.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

SEND FOR FREE INSTRUCTION BOOKLET

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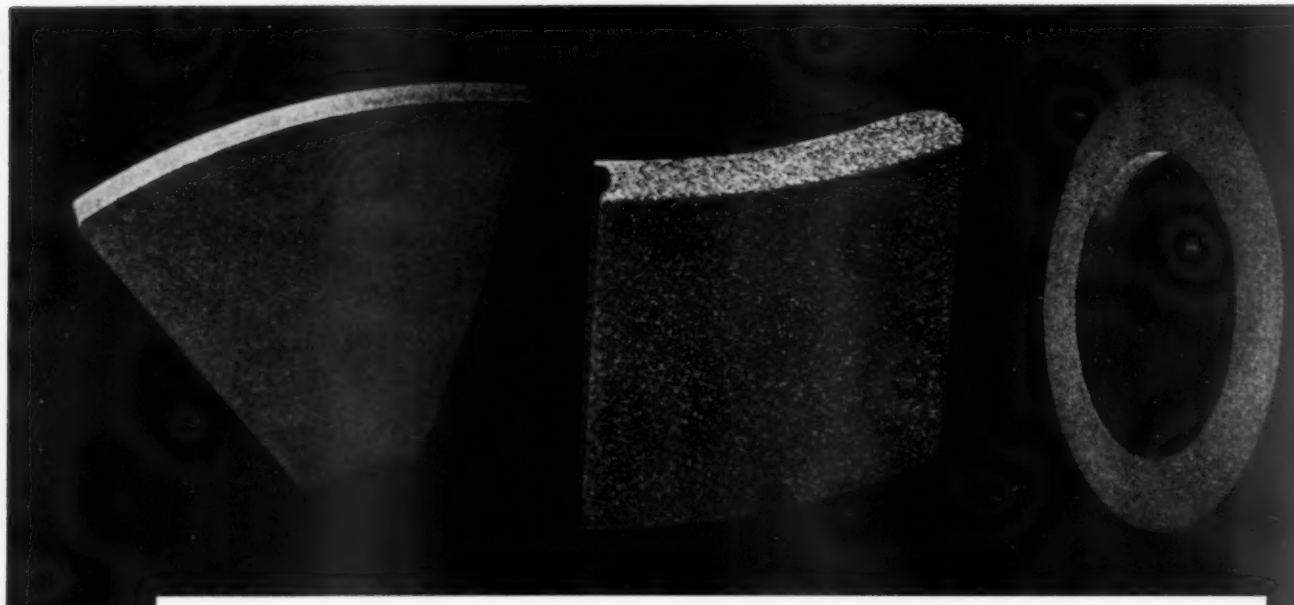


Beautiful music to a cost man's ears

Maybe you are unaware of profit leaks creeping into your plant through low production rates and excessive wheel replacements.

A new note of gladness will strike a responsive chord with your cost man when he sees the savings after a shift to job-designed Peninsular grinding wheels.

Peninsular engineers have specialized in such savings since 1889 and are available for a careful study of your grinding operations. They can show the way to substantial cost reductions through a change-over to wheels specially designed for your work. They make a complete analysis of your equipment, of the material to be ground, and of all other important factors that influence costs.

Their findings are used to develop a special formula and the proper shape for grinding wheels that are most efficient for your work. *Every* Peninsular grinding wheel is specially made for its particular job.

The Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit 7. *Sales Offices:* Chicago, Philadelphia, Boston, Buffalo, Cleveland, Newark, Pittsburgh, Houston, St. Louis, Cincinnati.

PENINSULAR

INDIVIDUALLY PENINSULAR ENGINEERED

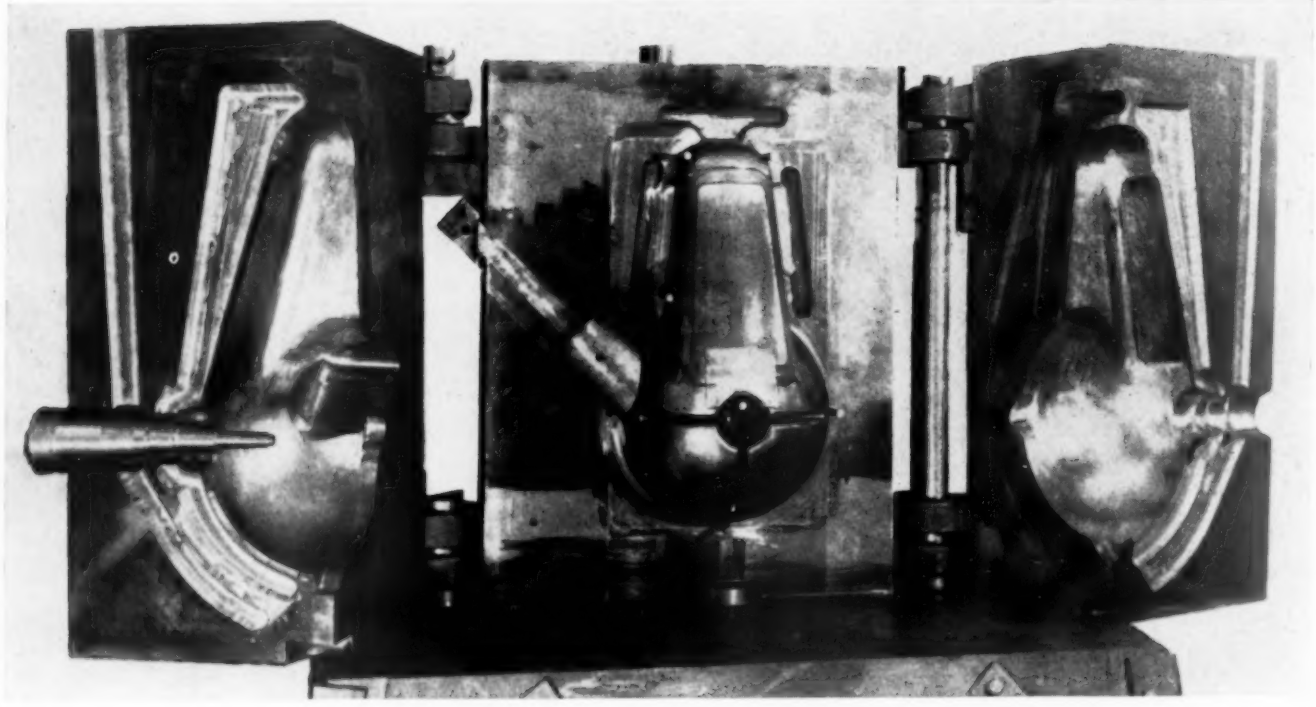
GRINDING WHEELS

SINCE 1889

SPECIALISTS IN RESINOID BONDED WHEELS

Top note: *Segmental wheel for disc grinding, straight wheel, and segment from a surface grinding wheel.* ***Bottom note:*** *Straight wheel for rough grinding, straight wheel, and segment from a surface grinding wheel.*

PERMANENT MOLDS



Permanent mold for fan housing

Designers and Manufacturers of Permanent Molds and Complete Service for Wood and Metal Patterns and Models

Excerpt from an article in The Foundry, August, 1946
"Permanent Molds for Castings"
by V. J. SEDLON

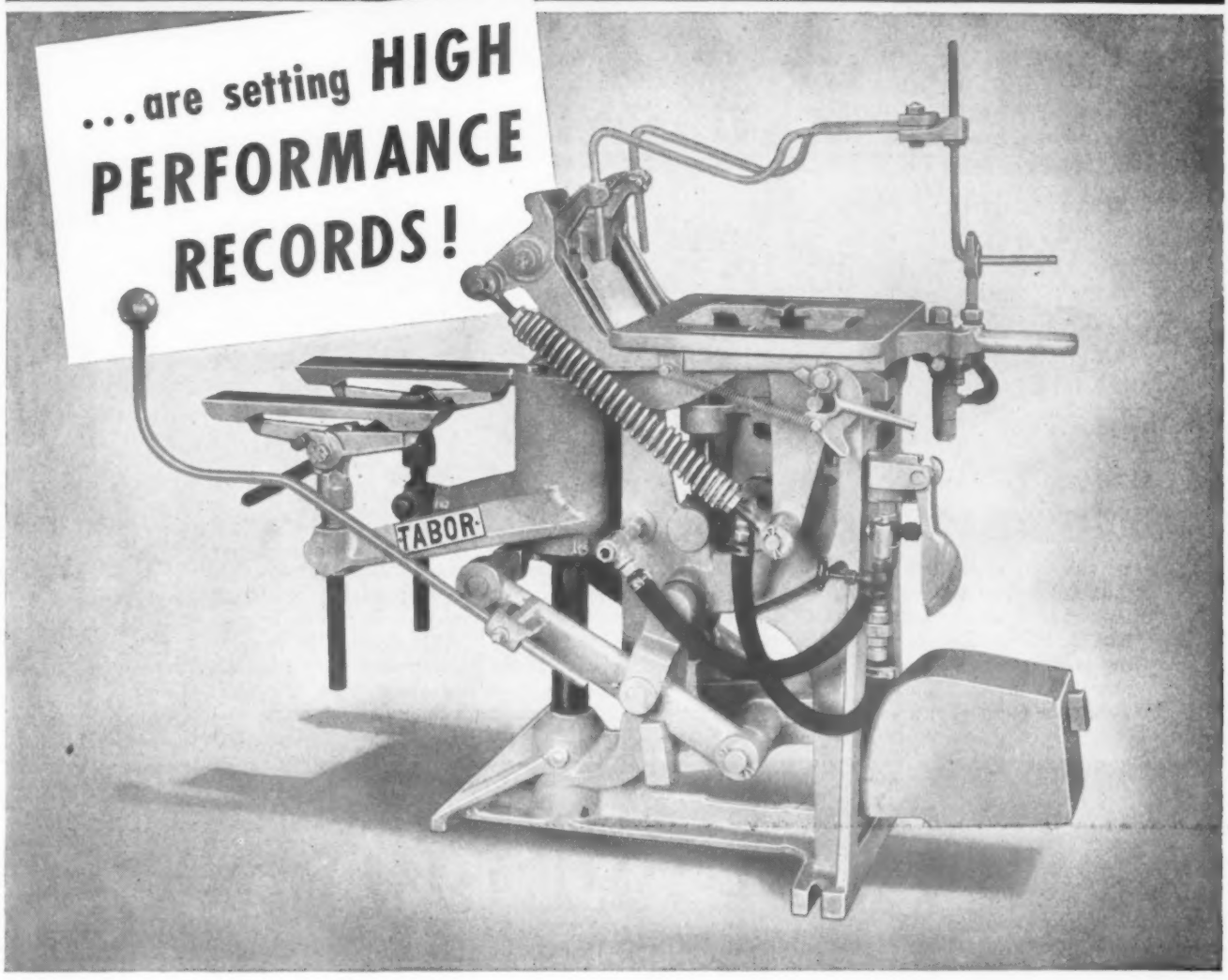
Reprints available upon request

The permanent mold process of producing aluminum castings is not an experiment. It is a practical and economical approach to the supplying of high quality aluminum items in large quantities. Mold costs are soon liquidated in large orders. Better castings are produced faster, they are more accurate and reduce to some degree the machining time as well as the polishing work which may be necessary.

MASTER PATTERN CO.

1315 MAIN AVENUE CLEVELAND, OHIO

TABOR JAR-RAM, HAND ROLLOVER, HAND-DRAW MACHINES...



MACHINE ILLUSTRATED

Table size: . . . . . 14" x 16"
Draw: . . . . . 8"
Clearance for combined depth of Flask, Pattern Board and Bottom Board: . . . . . 10"
Maximum outside width of Flask or Core box: . . . . . 18"
Capacity at 80# pressure—150#

THIS type of machine is in a class by itself for high production ability. The jarring member rams molds in the shortest possible time and the rollover member will handle flasks or core boxes, unrestricted in length, up to the full width and weight capacity of the machine.

Made in several sizes and capacities. Can be furnished with squeeze member added. Write for Bulletin 454 illustrating and describing the complete line.

TABOR PNEUMATIC VIBRATORS

Built to stand punishment. Durable and effective in action, they are the result of over a half-century's experience. Like all Tabor equipment, they will return unfailing, continuous service.

REPRESENTATIVES
Snyder Foundry Supply Company, Los Angeles, California; Gallagher Foundry Supply Company, San Francisco & Oakland, California; Carl F. Miller & Company, Seattle, Washington; M. W. Warren Coke Company, 1017 Olive St., St. Louis 1, Mo.; E. R. Frost Co., Inc., Minneapolis 14, Minn.

MANUFACTURERS' ASSOCIATION INC. FOUNDRY EQUIPMENT

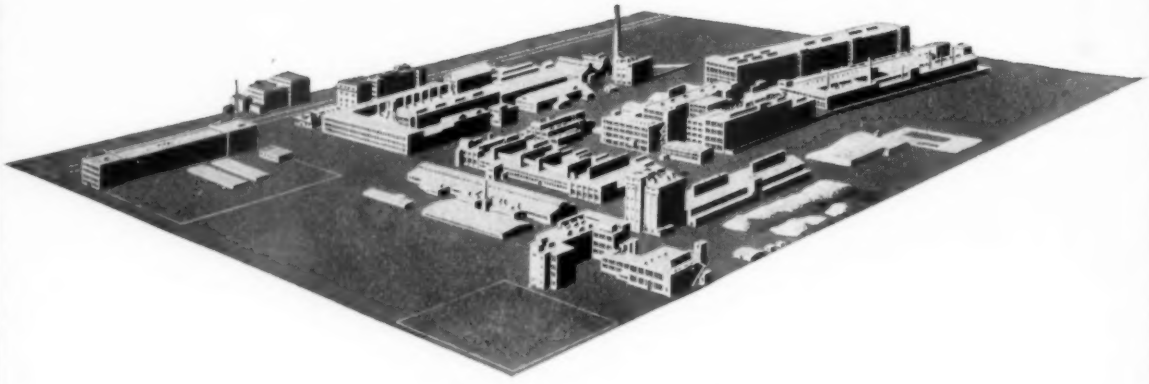
The TABOR *Manufacturing Co.*

SINCE 1884 MANUFACTURERS OF FOUNDRY MOLDING MACHINES
6225 TACONY STREET • PHILADELPHIA 35, PENNA.

A BUYING GUIDE FOR ABRASIVES

POINT No. 1

MANUFACTURING RESOURCES



It is understandable to anyone in Production that better manufacturing resources generally lead to a superior product. Quality is not to be had for the mere wishing. The vast manufacturing facilities of The Carborundum Company are known to be an important part of the nation's industrial picture, and are pointed to as being in the forefront of manufacturing and technical progress. Not the least of the reasons for the satisfying, uniform, and dependable quality of Abrasives by CARBORUNDUM are the spacious, modern, alert and efficient manufacturing facilities which produce those abrasives. The Carborundum Company, Niagara Falls, N. Y.

A Good Rule for Good Grinding...CALL IN

CARBORUNDUM

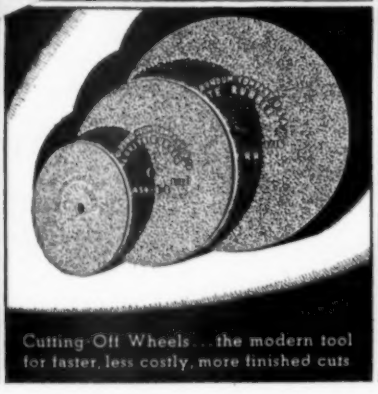
TRADE MARK

- BONDED ABRASIVES
- COATED ABRASIVES
- ABRASIVE GRAINS AND FINISHING COMPOUNDS

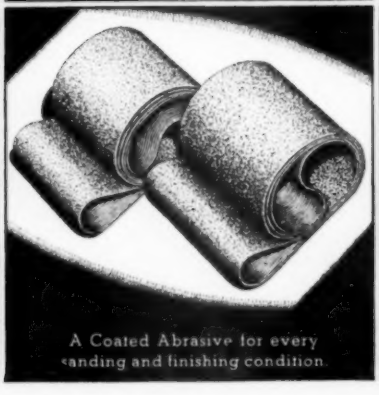
Tool Room sticks and stones that cut fast...last long...and hold their form.

Mounted wheels, in all standard grits and grades, for portable grinding equipment

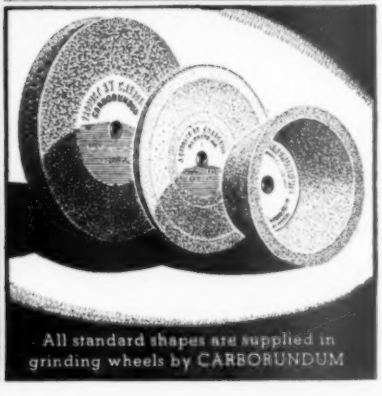
"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company.



Cutting-Off Wheels...the modern tool for faster, less costly, more finished cuts



A Coated Abrasive for every sanding and finishing condition.

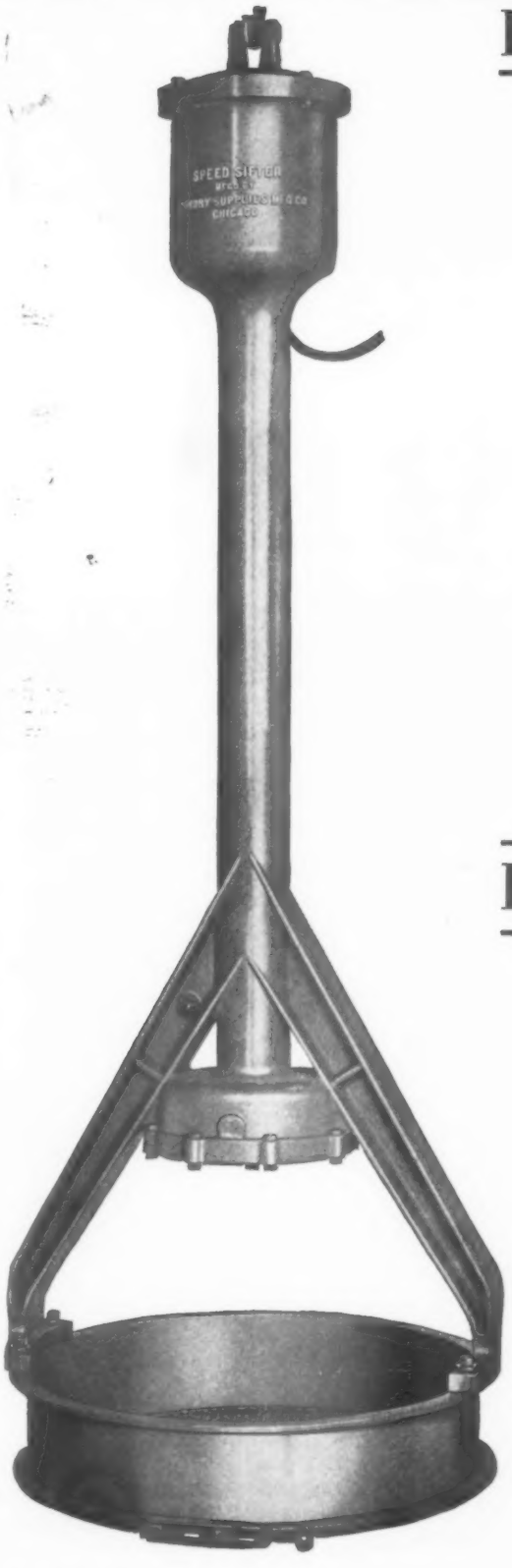


All standard shapes are supplied in grinding wheels by CARBORUNDUM

Increase Production

with the

ROTOPLANE SPEED SIFTER ★ RED ELECTRIC VIBRATORS



ROTOPLANE SPEED SIFTER

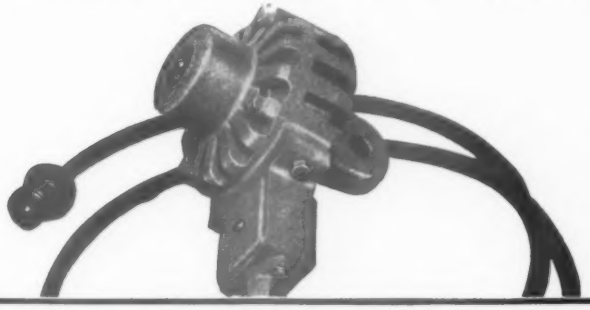
The ROTOPLANE Speed Sifter is an *improved* sand riddle of much greater capacity and much longer life. One size and type serves all purposes in the foundry — does *all* your sifting more quickly and economically.

It is easily handled by one man, weighs approx. 90 lbs., is 62 in. high overall. The one-piece frame of tough aluminum alloy makes for a remarkably effective vibration. Its smooth, free, rotary action vastly increases bearing life; all bearings grease packed. All mechanism of the ROTOPLANE is *completely* enclosed—no bearings or activating parts of any kind exposed to dust and grit.

The Quick-Change Sieves are instantly interchangeable, mounted in smooth, flat steel ferrule, with 20-inch diameter clear sifting area. No jagged edges to tear workers' hands, no storage problem.

$210.00 f. o. b. Chicago — complete with cable, safety ground wire. Standard 1/3 h. p. motor, 110 volt, 60 cycle, single phase.

UNIVERSAL FREE-WHEELING model equipped with motor as above $195.00



RED ELECTRIC VIBRATORS

True-to-pattern castings make satisfied customers . . . more repeat business. Increase your production and castings quality with RED Electric Vibrators. Sturdy, dustproof, lowest operating cost (electricity does not freeze). Unequaled for consistent year-'round results in foundries all over the world.

(All Prices f.o.b. Chicago)

No. 1—Light match plate work	$12.00
No. 2—Medium match plate work	15.60
No. 5—Heavy match plate, tub and bench work	20.40
No. 9—Machine and heavier work	28.80

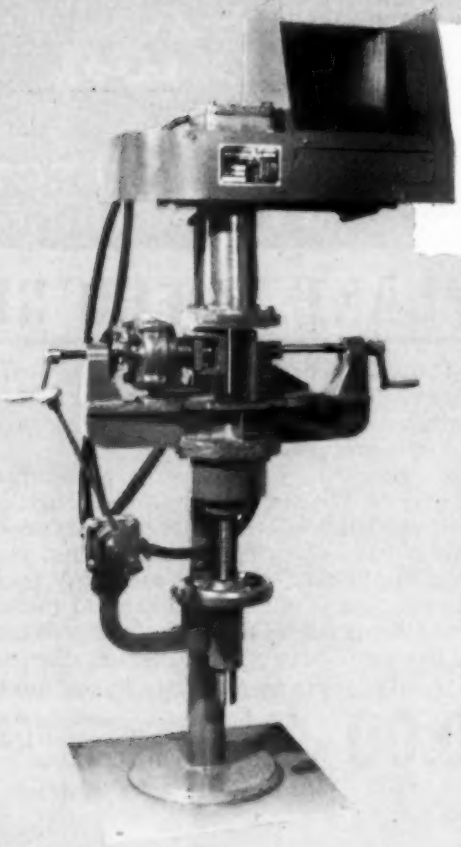
Third (ground) wire per U. S. Govt. code—furnished with No. 9 at no extra cost; $1.20 extra with Nos. 1, 2 and 5 vibrators.

KNEE SWITCHES for operating Red Electric Vibrators: Single pole $3.60, Double pole $4.80.

FOUNDRY SUPPLIES MANUFACTURING CO.

2221 Orchard Street **Chicago, Illinois**

CABLE ADDRESS: "ROTOPLANE CHICAGO"



POPULAR

The entire line of DEMMLER core blowing machines is popular because every DEMMLER core blower has proved itself a dependable, profitable investment.

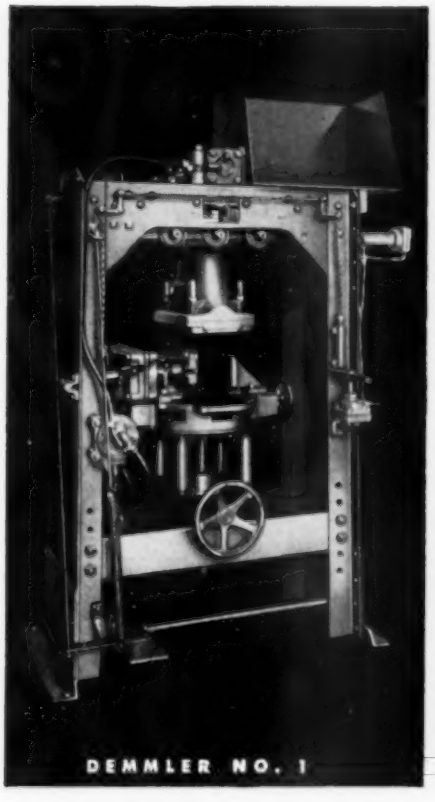
It is no news to the Foundry world that three prime requisites of profitable core making are rapid production, economical operation and the production of high quality cores. DEMMLER machines can be depended upon to meet all three of these requirements.

DEMMLER machines are ruggedly built throughout for hard foundry use. All have both horizontal and vertical adjustments. Jobs are easily and quickly changed.

Available in a wide variety of sizes to meet every requirement, DEMMLER core blowers possess scores of refinements born of long experience. First in the field, DEMMLER core blowers have led the field since 1911.

Before you buy a new core blower, be sure to investigate the many advantages DEMMLER machines offer. You'll be glad you did!

DEMMLER NO. 50



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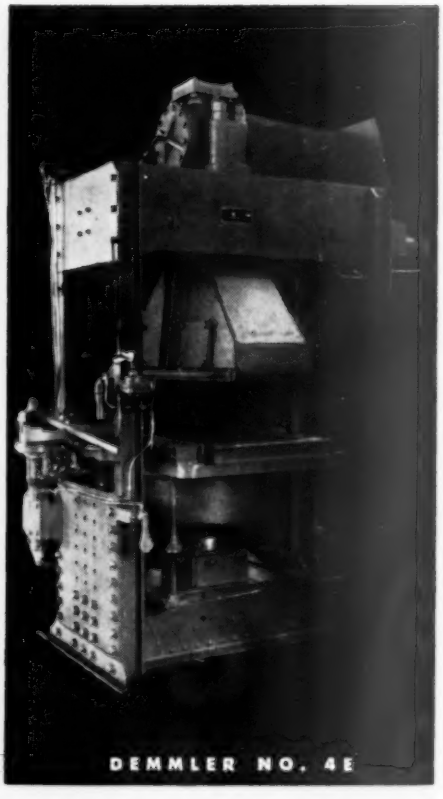
DEMMLER NO. 3E



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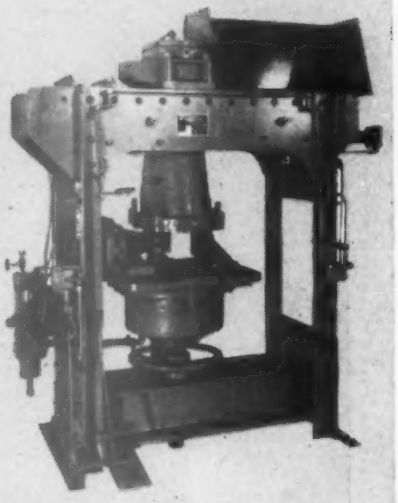
MANUFACTURERS OF CORE BLOWERS EXCLUSIVELY SINCE 1911

because they are profitable to own

DEMMLER

CORE BLOWING MACHINES



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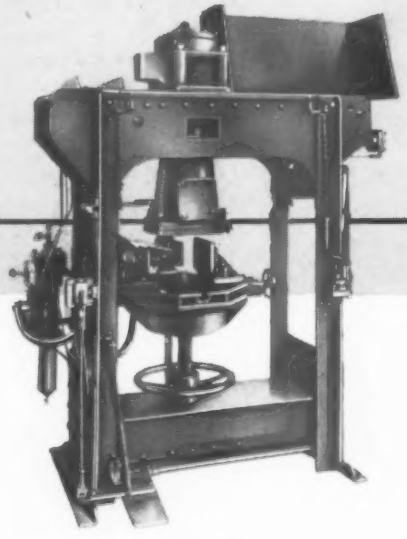

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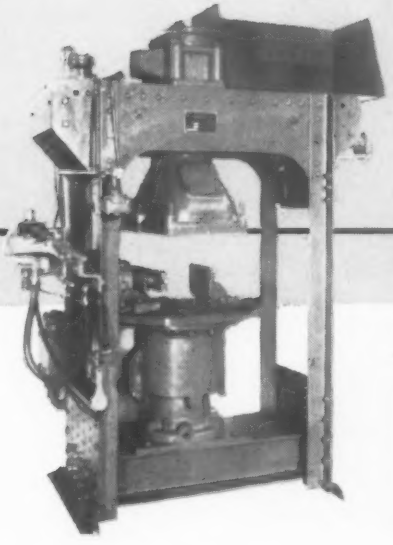

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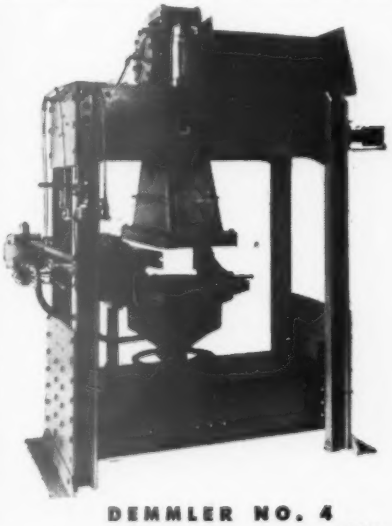

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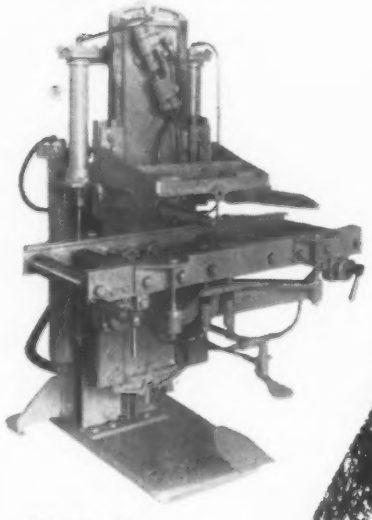
CORE BOX VENTS

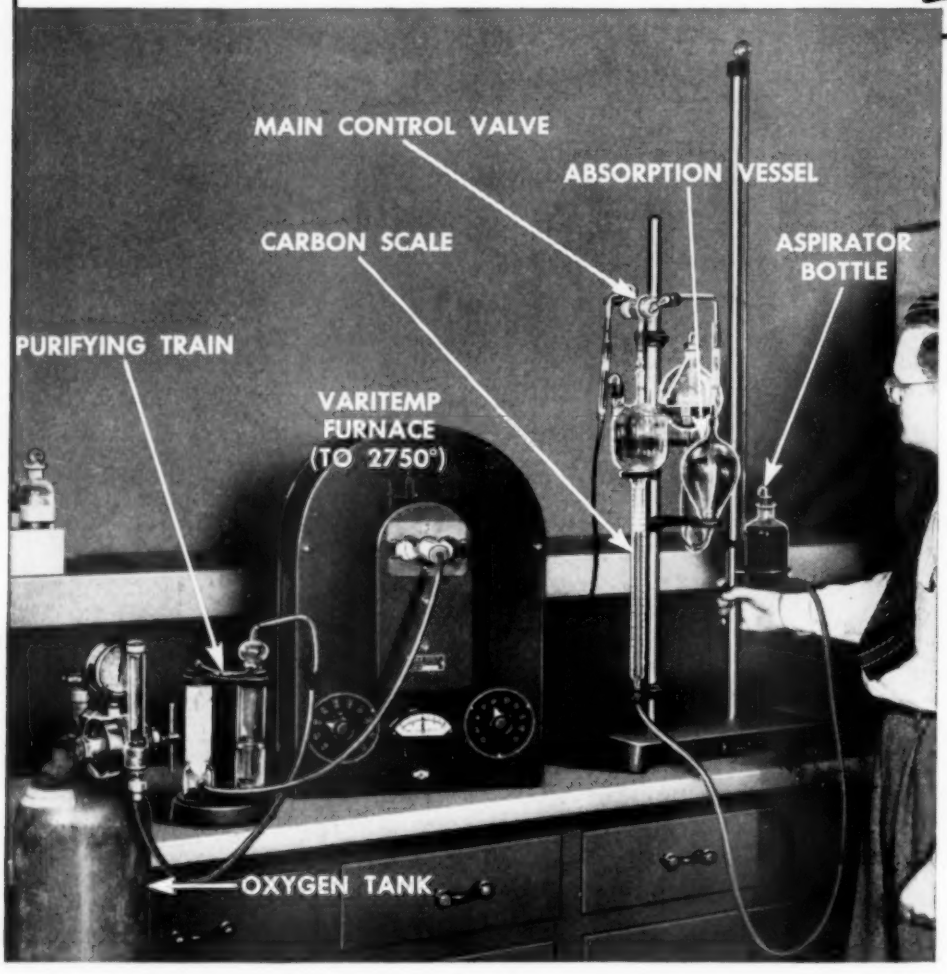
Wm. Demmler & Bros. also manufacture a complete line of precision made core box vents —rigidly constructed in varying sizes of slotted brass, slotted steel and screen mesh.



DEMMLER
CORE ROLL-OVER
DRAW MACHINE

Wm. **DEMMLER** *& Bros*
Kewanee, Illinois

DETERMINE CARBON IN *2 MINUTES*



for both IRON and STEEL

With the sample weighed and loaded the test cycle involves only:

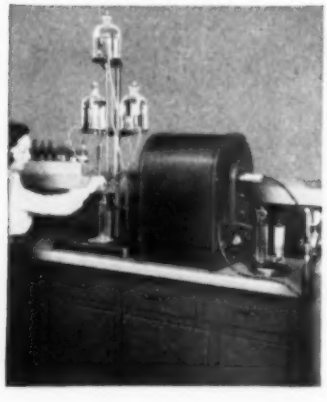
Start and stop oxygen supply.

4 Settings of Main Control Valve.

8 Short Motions of Aspirator Bottle.

Then you read graduated Carbon Scale, correct for temperature and barometric pressure and you have carbon to ⅕ of ONE POINT.

SIMPLE — STRAIGHTFORWARD — ACCURATE AND *NOT EXPENSIVE*



SULPHUR DETERMINATOR

For accurate analyses of metals, coal, coke, etc.

Testing cycle — 2 minutes.

Accuracy to ⅕ of One Percent.

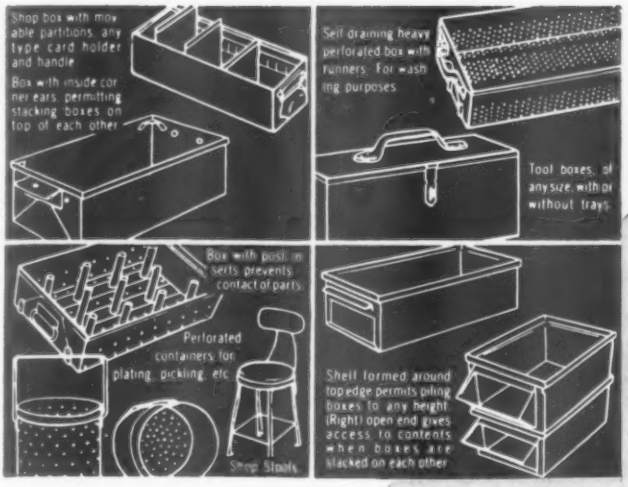
Applicable to either Iodate or Alkaline methods.

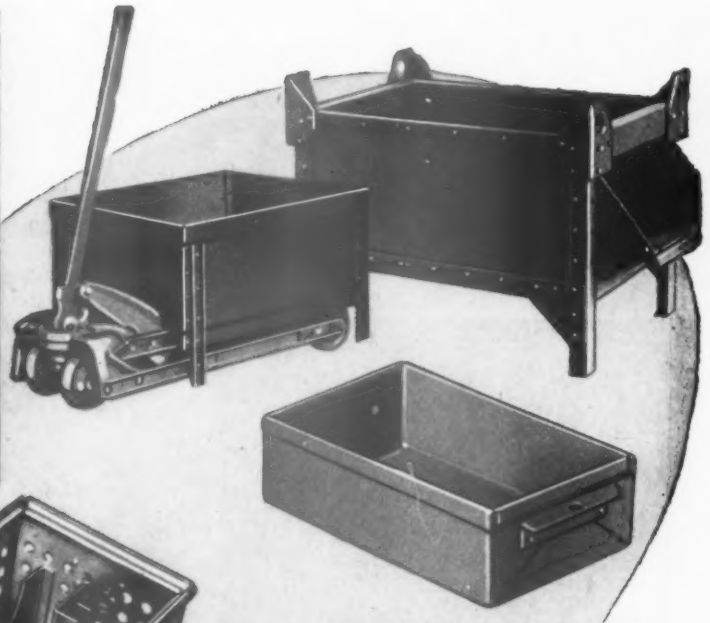
MOISTURE TELLER

Determines amount of moisture in a test sample usually within 1 minute and without the use of charts or log tables. Entirely self-contained and sturdily built. Needs no technical operator.

HARRY W. DIETERT CO.

9324 ROSELAWN AVE. • DETROIT 4, MICHIGAN


Shop box with movable partitions, any type card holder and handle
Box with inside corner ears, permitting stacking boxes on top of each other
Self draining heavy perforated box with runners. For washing purposes
Tool boxes, of any size, with or without trays
Box with post in serts prevents contact of parts
Perforated containers for plating, pickling, etc.
Shop Stools
Shelf formed around top edge permits piling boxes to any height (Right) open end gives access to contents when boxes are stacked on each other



Steel Piling Box with fixed or removable partition designed to hold one set of parts needed for any given assembly or sub-assembly. Big time-saver.

Stacking or Piling Box of excellent design, strong and durable. Any size, to suit your needs. *Above:* Triple Hem Shop Box made with straight or tapered sides

Shop Barrels, any style or size, built for long life and hard service.

Shop Stools with steel, solid wood or laminated wood seats. Sturdy reinforced legs, of any desired height.

Comfortable Back Rests of several different designs, may be had at a slight extra cost.

TO KEEP PRODUCTION *flowing smoothly*

Where small, loose products are used or produced, perfecting the materials handling system is often the most important factor in attaining lower production cost. An essential part of the system is properly designed, light and strong metal shop containers for the pickup, collection, and conveyance of materials to and from machines, finishing, assembly, packaging and storage.

Cleveland shop boxes, barrels, cans, pans and pails are usually custom-made, because the small extra first cost is trifling compared with the advantages gained, year in and year out, by having containers of exactly the right size, shape and design to fit individual needs and special handling requirements.

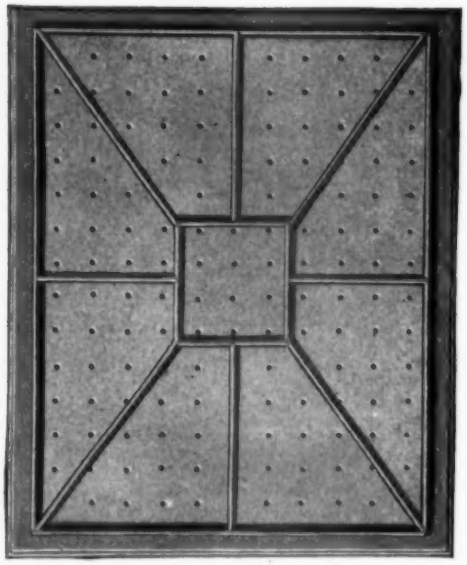
Catalog, prices, and design service on request, without cost or obligation.

SHOP EQUIPMENT DIVISION
Cleveland Wire Spring Co.
5250 BROOKPARK RD.•CLEVELAND 9, OHIO

Cleveland **STEEL SHOP EQUIPMENT**

CLEVELAND WIRE SPRING CO.
2012 West 25th Street, Cleveland 13, Ohio
Subsidiary of Reynolds Spring Company, Jackson, Mich.

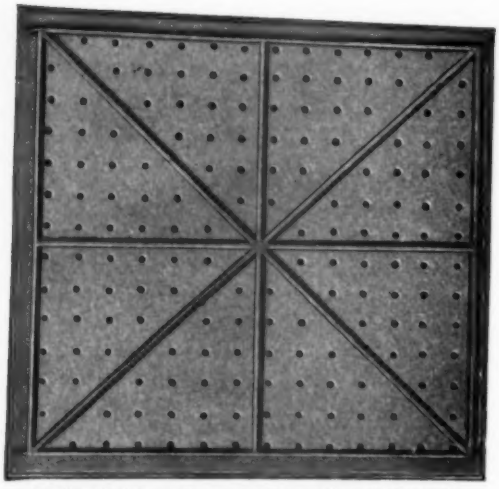
"DIAMOND" CUSTOM-BUILT CORE PLATES



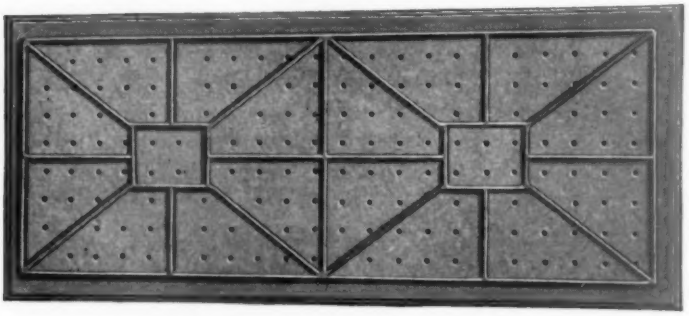
STYLE CP-3 — This type reinforcing on "square" plates for loads up to 1200 lbs. Typical sizes run 40" x 50" and 36" x 60".

CARRY CORES UP TO 1200 LBS. WITHOUT DEFLECTION!

Less baking time with Diamond Plates . . . because sturdy construction with light weight is achieved. They heat up and cool more quickly. Fabricated from ½" or heavier plate as indicated to meet load requirements, users acclaim the long-life and uniform quality of Diamond Plates. Available in special and standard sizes to suit your exact requirements.



STYLE CP-1 — This construction used on plates in the 30" x 30" range for core loads up to 200 lbs.



STYLE CP-2—For long and narrow cores and loads to the 1200 lb. range. Note web-bracing construction.

HOW TO ORDER DIAMOND CORE PLATES

Since we recommend "job fitted" plates for real production efficiency, we suggest your telling us *how heavy your core loads will be* and the *approximate overall plate size*. We will design reinforcing accordingly, and quote in terms of plates best suited to your needs.

DIAMOND

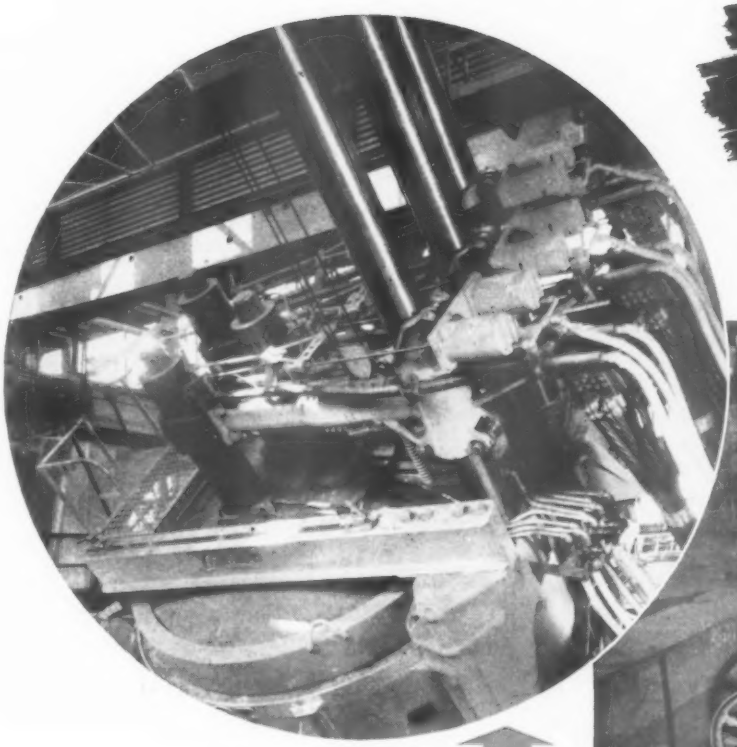
Telephone 2553 — CLAMP AND FLASK COMPANY — Richmond, Indiana

Designers of CORE PLATES, JACKETS, BANDS, FLASKS *since 1889*

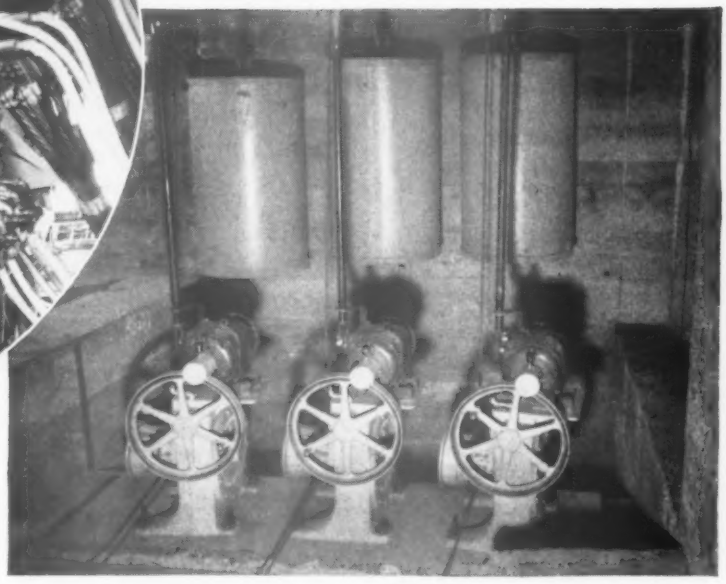
Economical Control

OF METAL MELTING

MOORE RAPID
Lectromelt
FURNACES



Lectromelt in operating position showing power operated clamps.



Electrode operating winches and counterbalances.

Economy through close control during the entire melting process is another feature of Lectromelt's outstanding economy. The patented counterbalanced electrode arms and the friction bite winch system make possible the most rapid and sensitive electrode control. Result — greatly reduced electrode consumption and breakage — more economy.

PITTSBURGH LECTROMELT FURNACE CORPORATION
PITTSBURGH 30, PENNA.

Pioneered by North American

LUMINOUS OR LONG FLAMES with either gas or oil are produced by the Series 113 Burners. They are desirable for vast coverage, for fewer burners and for uniformity of flame temperature.

SHORT FLAMES are produced by the Series 221 Burners. These burners provide a highly stable and efficient fire, using either gas or oil. They are recommended wherever heating in a relatively small space is required.

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DUAL-FUEL BURNING SYSTEMS FOR GAS AND OIL

MAXIMUM EFFICIENCY WITH EITHER FUEL

—

SWITCH FUELS INSTANTLY

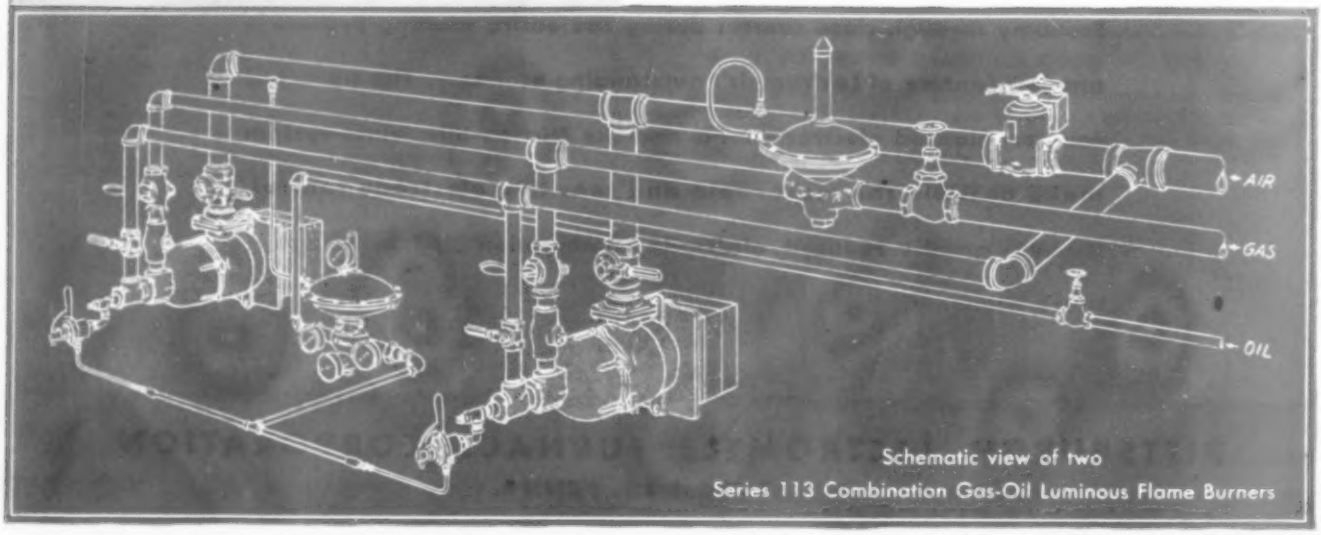
—

AUTOMATIC FUEL-AIR PROPORTIONING

—

WIDE TURNDOWN RANGE

THE NORTH AMERICAN MANUFACTURING COMPANY
MANUFACTURERS OF INDUSTRIAL FUEL BURNING EQUIPMENT FOR GAS OR OIL
BRANCH OFFICES with FIELD ENGINEERS in PRINCIPAL CITIES
CLEVELAND 4, OHIO

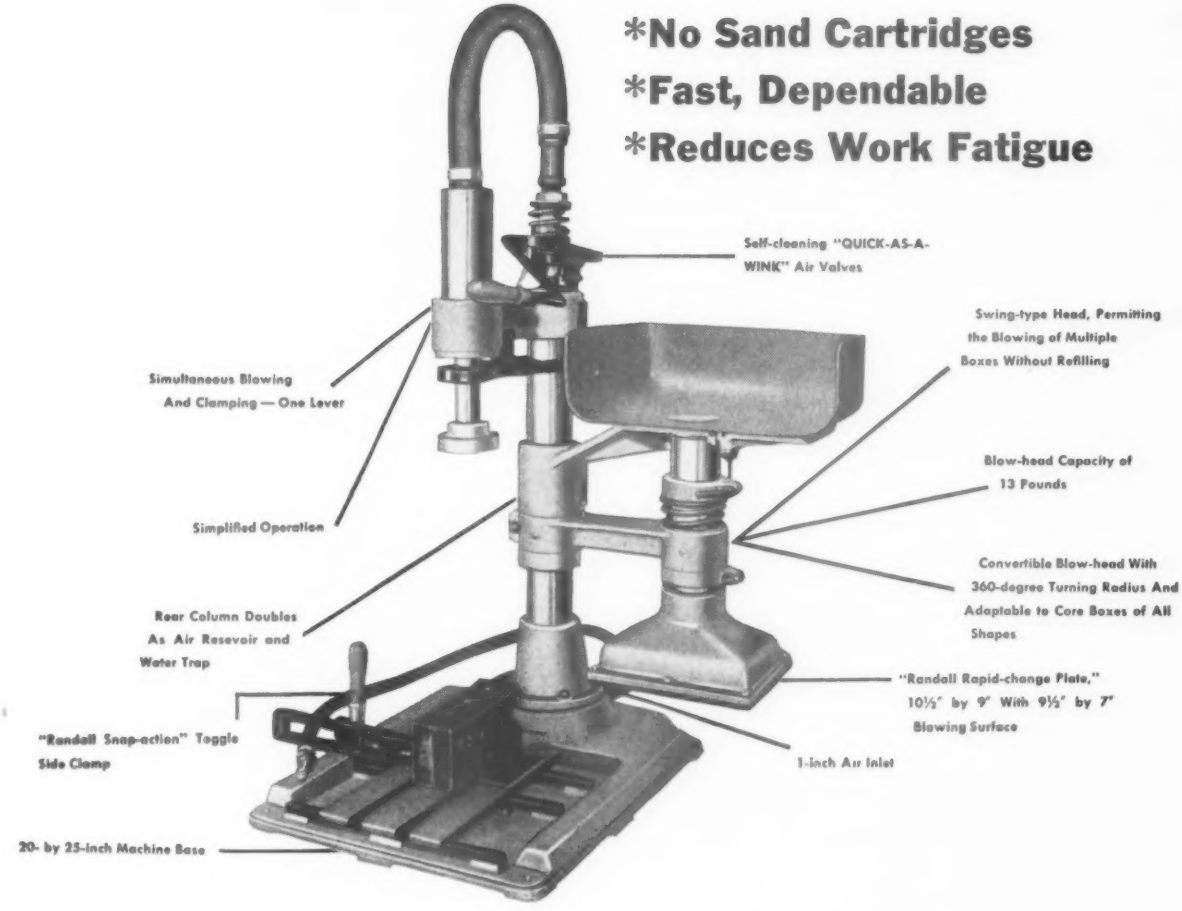


Schematic view of two
Series 113 Combination Gas-Oil Luminous Flame Burners

NEW RANDALL CORE BLOWER

With CONVERTIBLE, SWING-TYPE HEAD

***No Sand Cartridges**
***Fast, Dependable**
***Reduces Work Fatigue**


Self-cleaning "QUICK-AS-A-WINK" Air Valves
Swing-type Head, Permitting the Blowing of Multiple Boxes Without Refilling
Simultaneous Blowing And Clamping — One Lever
Blow-head Capacity of 13 Pounds
Simplified Operation
Convertible Blow-head With 360-degree Turning Radius And Adaptable to Core Boxes of All Shapes
Rear Column Doubles As Air Reservoir and Water Trap
"Randall Rapid-change Plate," 10½" by 9" With 9½" by 7" Blowing Surface
"Randall Snap-action" Toggle Side Clamp
1-inch Air Inlet
20- by 25-inch Machine Base

A single motion of the left hand clamps the core box in place, a single motion of the right hand simultaneously clamps the head and blows the cores. *It's as simple as that* with the new RANDALL CORE BLOWER, the latest contribution to the modernization of the foundry industry.

Quality cores are produced fast by the RANDALL, and in any business *speed plus quality means economy, and economy means profits* . . . .

But the superiority of the RANDALL isn't limited to the actual core-blowing operation alone. Its *swing-type head*, possessing a sand capacity of 13 pounds, dispenses with sand cartridges and the costs and extra motions they involve, at the same time permitting the blowing of multiple cores without refilling. The *360-degree turning radius* of the head makes the machine readily adaptable to core boxes of all shapes.

The many other features of the RANDALL include the RANDALL RAPID-CHANGE PLATE, measuring 10½ x 9" and boasting a blowing surface of 9½ x 7"; the RANDALL SNAP-ACTION TOGGLE SIDE CLAMP; an ability to conserve air; and, above all, unquestionable reliability.

All of these features combine with many more to make the RANDALL CORE BLOWER the efficient core-making unit it is, and promise foundrymen real relief from outmoded and expensive core-making methods. And the RANDALL CORE BLOWER can be depended upon to maintain such a standard of service for years.

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Randall "DESIGNED TO PRODUCE"

BLOW MACHINE COMES COMPLETE WITH CLAMP

THE RANDALL CORPORATION, 2636 S. Main, ELKHART, INDIANA

THEY ALL LIKE HINES

HINES
POP-OFF
(Trademark Reg. U. S. Pat. Off.)
FLASK

. . . . THE BIGGEST MONEY-SAVER PER INVESTMENT DOLLAR IN THE FOUNDRY

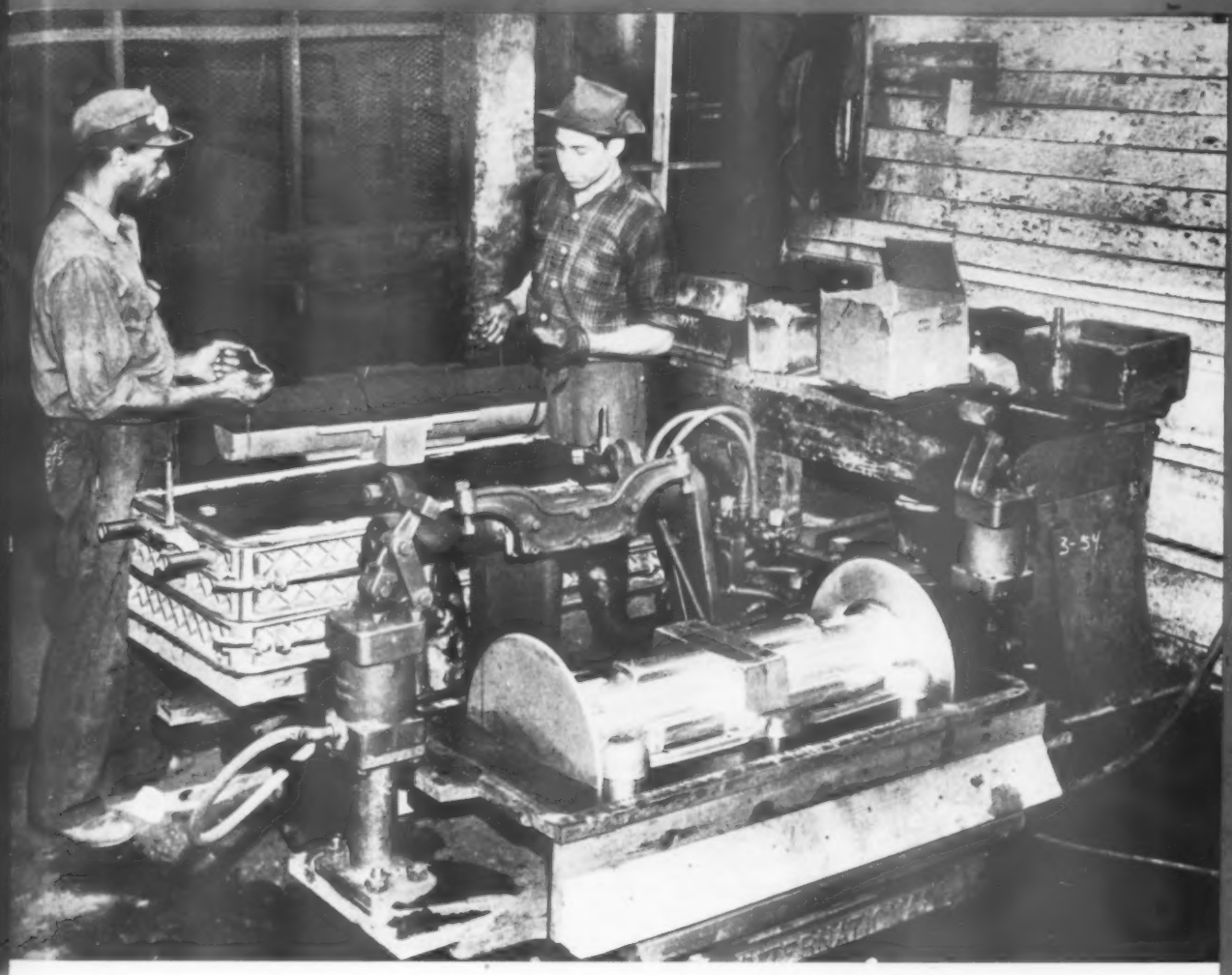
Fully Protected by Patents and Patents Pending

THE HINES F

3431 WEST 140th ST.

"Pop-Off" FLASKS..

TRADE MARK



HINES "Pop-Off" flasks are receiving enthusiastic acceptance in foundries all over the country. They like the way these precision-built flasks perform under all foundry conditions. The patented "Pop-Off" feature eliminates pounding or mauling the flask—no shake-out costs—just upset the mold and hook the casting out. Serrations on the inside of flask do away with sand strips—prevent sag and drop in cope and drag—give more bearing and a tight joint at the parting line.

S FLASK CO.

CLEVELAND 11, OHIO

OUTSTANDING ACHIEVEMENTS OF NATIONAL SMELTING *Research*

ALLCAST
ALUMINUM ALLOY

• The National Smelting laboratory, one of the largest and finest of its kind in the country, has produced a number of the outstanding developments of the industry. One of these is Allcast, an important advance in aluminum metallurgy.

Allcast is a high quality, general purpose aluminum casting alloy whose properties successfully meet a large number of casting requirements.

The mechanical properties and foundry characteristics of Allcast are as good or better than those of the standard high strength aluminum casting alloys used in aircraft construction during the war.

An informative bulletin on Allcast — giving principal advantages, mechanical properties, and recommended applications — is yours for the asking. Just note your request on your company letterhead, and we shall be glad to send a copy.

THE NATIONAL SMELTING COMPANY
6706 GRANT AVENUE • • • • • CLEVELAND 5, OHIO

NATIONAL SMELTING

Co-operation on Patterns Will Cut Casting Costs

WHEN we consider the various operations required in producing a casting, the important contributions of the patternmaker to the successful culmination of foundry process frequently are overlooked. As has been pointed out many times, pattern equipment plays a most important part in determining the cost and serviceability of the casting. Unless the patternmaker is well skilled in his art, the pattern will not meet the needs of the foundry, and it is quite likely the casting will not be satisfactory to the customer.

The patternmaker must have a wide range of skills. He must understand the mechanical drawing, the means employed by the engineer and the draftsman to convey ideas to the production department. He must have vision to picture in three dimensions the part developed by the design department and brought to him on the blueprint. He must have the skills of a craftsman that will permit him to construct of wood, metals, plaster, plastic or other materials the part eventually to be produced as a casting.

The patternmaker must understand the peculiar characteristics of various metals from which castings are made, and he must know the fundamentals of gating, parting and draft. He must understand the problems of shrinkage, and be able to construct pattern equipment that will take advantage of the principles of directional solidification. These and many other bits of knowledge are required in the manufacture of patterns that will produce good castings at a minimum cost.

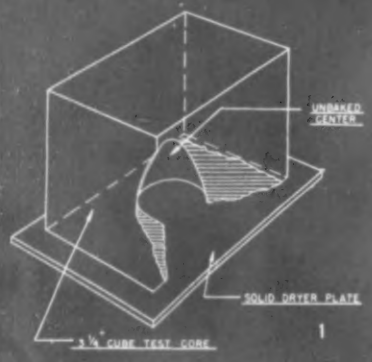
Why are patterns frequently unsatisfactory for the particular foundry commissioned to produce the castings? Too often the designer is not at all familiar with foundry techniques or the limitations of the casting processes. As a result, the blueprint that reaches the patternmaker includes features which will not permit a castable part. Here the patternmaker has the opportunity of pointing out the mistake in design before time, materials and money are spent in producing a pattern that cannot be cast successfully in the foundry.

Because foundry techniques have not reached a point of standardization which permits identical practices from plant to plant, it is most important that the patternmaker know of the practices and equipment in the particular foundry that will make the casting. Furthermore, the knowledge and skill of the foundryman may be of tremendous value to the patternmaker in permitting the production of pattern equipment that will eliminate the necessity for trial and error methods in developing suitable procedures in the foundry.

While patternmakers have made many contributions to foundry progress, future possibilities for help are great. If the patternmaker will insist on having complete co-operation between the designer, the foundrymen and his own department before any pattern work is started, greater foundry economies and more satisfied customers of castings will be assured.

Frank G. Steinebach
Editor

An engineer looks at Sand



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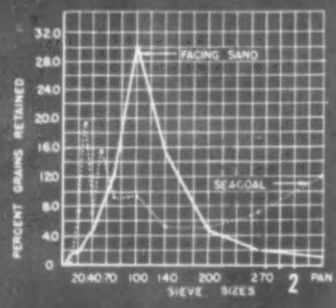

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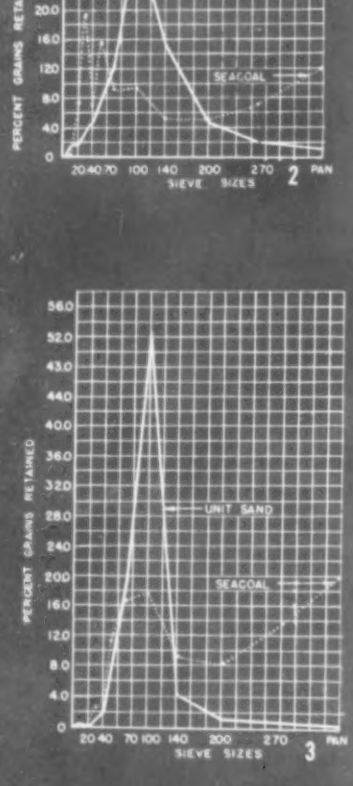


3

SAND problems in the foundry today are not much different than in the past, although, figuratively speaking, the solution to these problems has in many instances been more real. This has been due in no small means to the almost universal acceptance of sand testing and control. Even with this, the author has found too many obvious sand problems existing in what is believed to be a field of control which seem to lack a definite program or purpose. Foundrymen are not to blame for this condition, for the correction of many of our sand problems is too often dependent upon hidden variations.

It is not at all an uncommon circumstance in well organized foundries to find materials being used which are inferior in quality. In view of the present scarcity of so many of our basic materials, this is to be expected. The first problem in sand control, as well as in other foundry processes which must continually be controlled, is to find the best means of using these substitute materials.

Too often foundries accept shipments of sand and binders for use in core and molding sand without considering even the simplest of evaluation tests which in many cases would reduce future sand problems. One of the most outstanding examples of this practice is believed to be the foundries which put in natural molding sand for winter's stock without testing this material's physical properties. A neglect of this nature, while not requiring much in the way of either time or cost, deprives the operating men of information necessary in the prevention of future troubles.

Depend on Suppliers of Raw Materials

Most foundrymen depend to a great degree upon their suppliers of raw materials for uniformity. It is reasonable to believe that the producer of these binders and raw materials is putting great effort to maintain his standard of a uniform product. It must be remembered that here too, the producer is dependent upon other suppliers or natural deposits of materials and has labor problems not too much unlike those of the foundryman himself.

To insure against these hidden variations, one must admit that they exist and determine if they are of a magnitude which will affect his product. If they are, the necessary steps can be taken to change the composition of his sand mixtures to compensate for the change in quality of the raw materials. In most instances, tests will find that the materials are of the same quality as previous shipments. This will assure the foundryman that he has one less production worry.

While variations in the qualities of sand and binders are admitted to be the underlying cause of some foundry production losses, there are many others. Each of the contributing materials and conditions should be discussed at length but, due to limited space, the author wishes to discuss what he considers some of the more basic troubles.

Moisture—This is not entirely a material which should be classed as a trouble maker in foundry sand and cores. Many examples could be given where the moisture content of sands is being forced down to the danger point and more production is lost due to too low a moisture resulting in wash, mold breakage, irregular parting lines, dirt and scabs than was ever experienced from too high a moisture.

A high moisture content in sand is the point at which the mixture begins to "feel" too wet to the touch, and the hand is by no means as sensitive to moisture differences as is the elbow. The limits between which the sand mixture feels neither dry nor wet is the important factor to consider in any sand. This may be a broad range or a very narrow range depending to a great degree upon the amount of clay present, the total fines or the angularity of the grains. It is believed not to be so much the total amount of water in a sand that makes a casting blow-hole as it is the free or unabsorbed water. This is over and above the amount of moisture necessary to satisfy the foregoing conditions.

Problems

By EARL E. WOODLIFF
Foundry Sand Service
Engineering Co.
Detroit

Some foundrymen have found it a distinct advantage to add materials such as silica flour, earthy clays, natural molding sand and wood flour to broaden the limits for moisture control and reduce the free water present in their sand mixes. The advantages gained have been more practical control limits and reduction in casting blows and pin-holes.

The question arising from this practice of adding water absorbing materials to sand mixes is: Which of the materials are best to use? In the case of core sands, it seems that small additions of silica flour are beneficial. In molding sand for light work with a clay test of less than 12 per cent, the use of a more earthy clay and wood flour should prove to be helpful. In heavier green molding sand, either natural molding sand, earthy clay, silica flour or cereal flour may be used to an advantage. The materials selected in any case will, to a large extent, depend upon conditions under which the sand is used. Steel foundrymen prefer the use of silica flour and cereal flours whereas iron foundrymen may use any one or more of the mentioned materials.

Green Strength vs. Clay Content—The amount of clay (by AFA method) present in a molding sand is an important sand problem, even though to a number of foundrymen this represents only a material which gives green bond. In this respect it is of first importance, for there must be ample working strength. This is wholly in accord with accepted practices. The point which presents the problem is not the green bond strength but is the amount of clay present in the sand necessary to support this bond strength properly. There seems to be little relationship between different types of clays for bonding of sands in regard to amounts and resulting green bond strengths. Most natural sands seem to require about 2 per cent clay substance to sustain 1 lb green compression; that is to say, the green compression test reading multiplied by two shows a close approximation of the clay substance present.

Under this same analogy, earthy clays and pulverized fine clays roughly support 1 lb green compression load per cent clay by analysis. (*Please turn to page* 182)

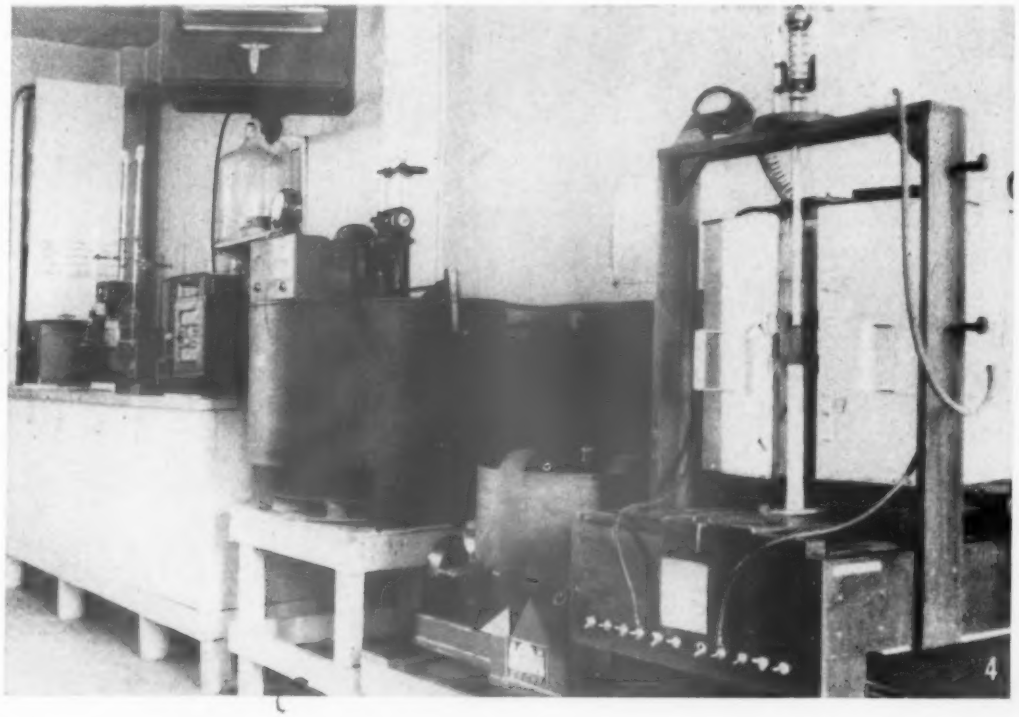


Fig. 1—Cube test block for testing baking-out qualities of a core oil

Figs. 2 and 3 — Typical grain distribution curves of molding sand and seacoal. Mixture in Fig. 3 made rough castings; Fig. 2—drop-outs

Fig. 4—Partial view of the author's sand and sand binder testing laboratory

APPLYING GOOD MANAGEMENT IN THE

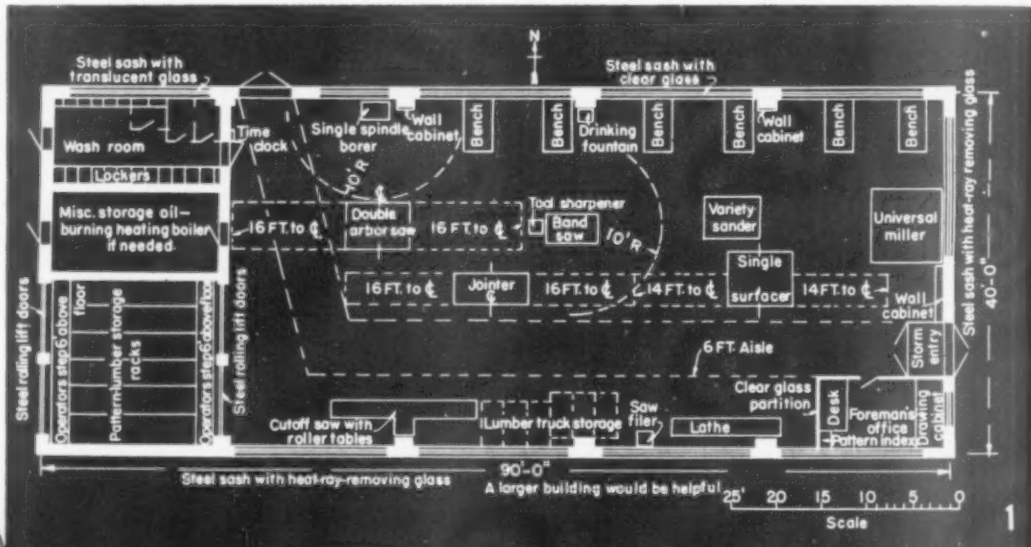
By GREGORY M. DEXTER
Consulting Industrial Engineer
Scarsdale, N. Y.

MANY industrial plants operate pattern shops with six or more patternmakers, but they often neglect the possibility of getting lower costs and better patterns. Scrutiny of operations by the industrial executive along certain lines should be fruitful in better management results.

Study of flow lines to and in a pattern shop should be as revealing of lost motion as for any production machine shop. Shop location between machine shop and foundry usually is desirable. Much waste often may be traced to poor location of machine tools in the shop.

Flow of pattern lumber should start from one end of the shop. It should be stored in racks with sufficient capacity where it can be acclimated to shop conditions before use. Six-months storage capacity usually is desirable. Receiving ends of the racks should be reached preferably through large doors in the shop wall through which truck deliveries of pattern lumber can be made direct. Lumber should be racked carefully with strips between the piece and each piece level. If pieces are stored vertically on their sides, there should be strips between them also to prevent warping. Some persons consider seasoned lumber better than kiln-dried lumber in the pattern shop.

A motor-driven, swing, cut-off saw about 16-in. diam, with automatic gage and roller-equipped table, should be



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Pattern Shop

adjacent to the delivery end of the lumber racks. The next tool needed is the rip saw. Preferably it should be about 12 or 14 in. diam and a two-arbor machine with tilting table. It can be shifted quickly from rip to cross-cut. In order should follow the 16-in. jointer and the 20 to 24-in. surfacer.

Work benches preferably should be placed close to and at right angles to the north wall so that light from the windows may pass over the patternmaker's left shoulder. Another arrangement is to have the benches in pairs with backs adjacent but perpendicular to the north wall. Ample space should be allowed between benches so that work at the vises may be carried on without interference. If a north wall is not available, the second choice is the east wall, with the west wall as the third choice. Windows should be as large as possible. Those in the west and south walls particularly should be fitted with a special type of glass that in large measure removes the heat rays of the sun but does not stop the light.

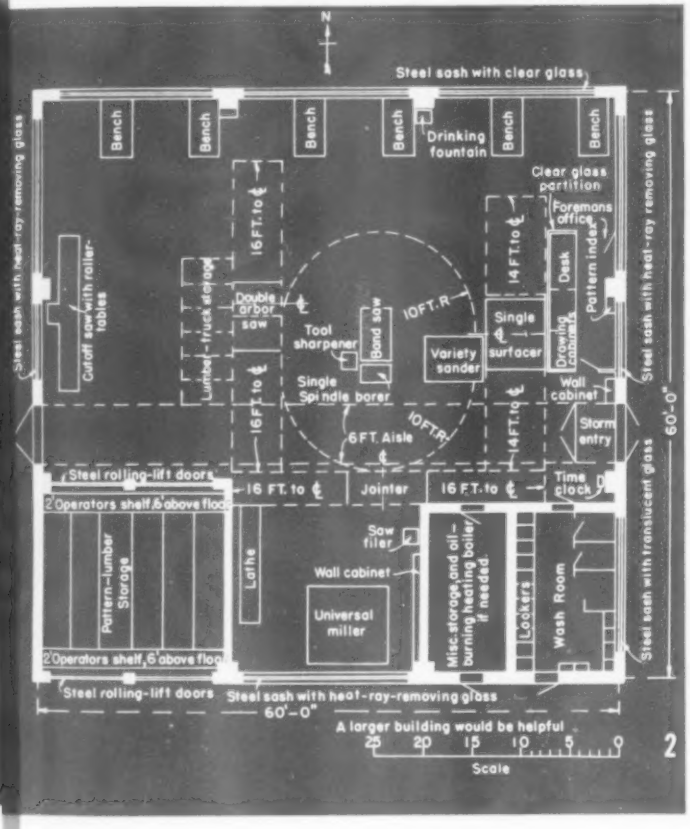


Fig. 1—Proper arrangement of facilities in pattern shop of 3600 sq ft floor area

Fig. 2—Alternate arrangement in shop of same area but different dimensions than in Fig. 1

Fig. 3—Patternmaker using trammel points on pattern for pump cylinder casing at Worthington Pump & Machinery Co., Harrison, N. J.

Most frequently used tools in a pattern shop are the band saw with tilting table, the 12-in. or regular patternmaker's lathe, and the combination 30-in. disc and spindle sander. Pattern shops without a sander exist but only at great loss in efficiency. These tools should be located between the benches and the rip saw, jointer and surfacer. The tool sharpener and a drinking fountain should be near the band saw. Location of other infrequently used tools such as the automatic saw sharpener and single-spindle borer is not so important as the location of the preceding tools.

Discusses Shop Arrangement

Space for work on large patterns on the floor should be left between benches and machine tools. These tools often can be arranged to advantage in two rows. The foreman's office should be near the work benches and enclosed with clear glass. It should have drawing files and card index of patterns in storage. Men's lockers should be nearby.

Many pattern shops are equipped with second-hand or slow-speed machine tools. A composite estimate by the workmen in the shop of the hours each tool is used or actual records of use will often show that at least some of these tools should be replaced with larger or higher-speed units. This comment applies particularly to the rip saw, band saw and sander. Use of a slow-speed, second-hand drill press from the machine shop instead of a modern, single-spindle borer, or the use of a saw sharpener that is not automatic, usually can be shown to be uneconomical. Tools in use should be checked for revolutions per minute, peripheral speed, rate of feed, and horsepower of motor drive as compared with specifications for modern units.

If company finances permit, the pattern shop probably should have other tools such as a 60-in. gap lathe and scroll saw. A hand-operated chain hoist over the large lathe is desirable. The larger pattern shop should have two rip saws, two jointers and two surfacers. The shop working also in metal should have a drill press, machinist's

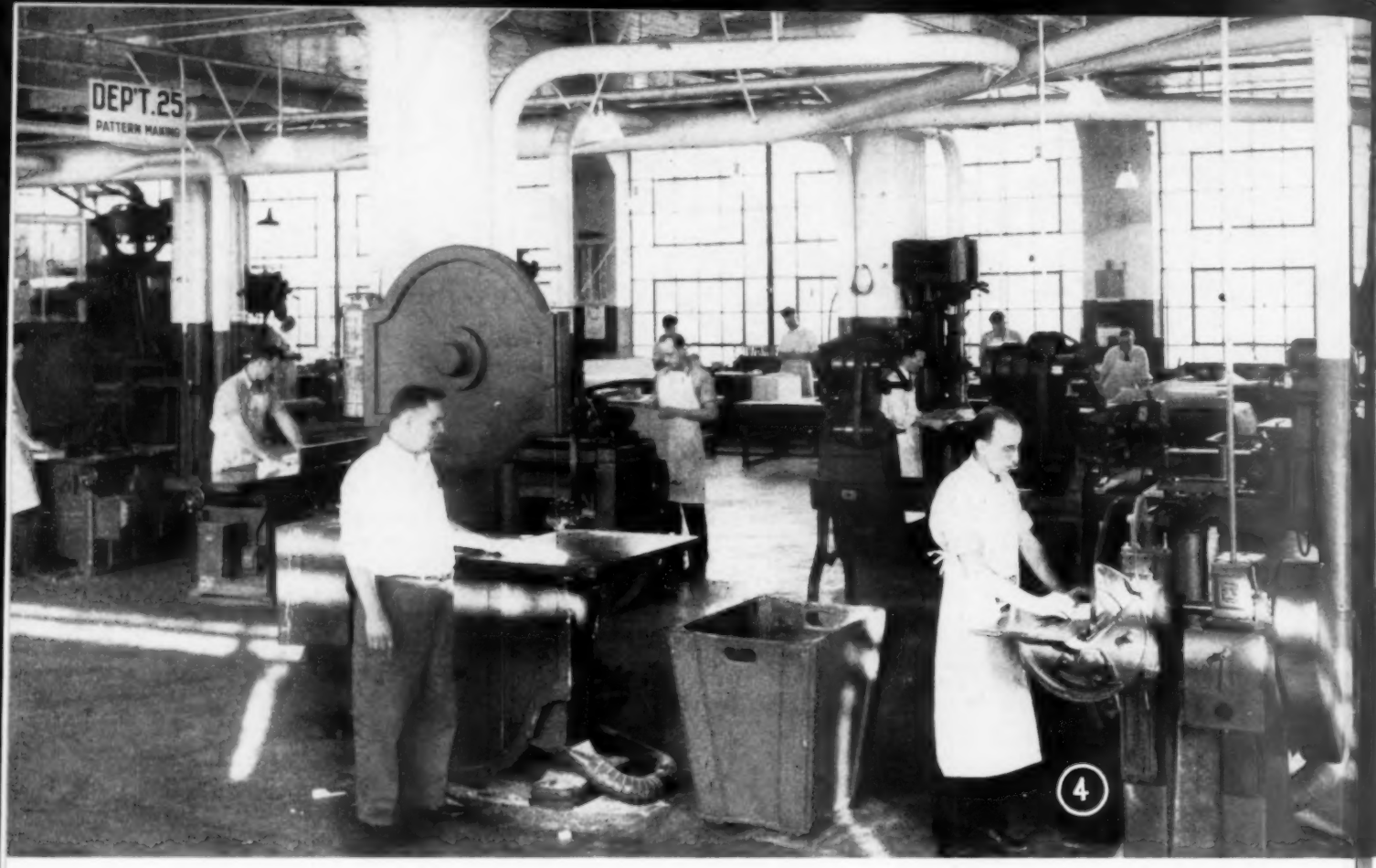


Fig. 4—Good illumination in the pattern shop, is necessary if working conditions are to be satisfactory

Fig. 5—General view of part of wood pattern shop, Worthington Pump & Machinery Corp., Harrison, N. J.

Fig. 6—Patternmaker working on wood pattern for casing of 24-in. circulating pump

(Photos by Ewing Galloway, N. Y.)

lathe, shaper, milling machine and portable grinders.

Even in the small pattern shop, consideration should be given to the purchase of a small, universal wood-milling machine. This versatile tool frequently pays large dividends. It can do intricate shapes, coreboxes, fillets and gear teeth as readily as any milling machine in a machine shop.

Exhaust hoods in the pattern shop for the machine tools usually can be justified to prevent scoring of lumber, reduce danger of fire and provide pleasant working conditions. Power-driven hand tools should include a drill, chisel and a grinder with various attachments. They are inexpensive and permit important savings in hand labor. Several stake trucks should enable each patternmaker to assemble his cut lumber without excessive walking between his bench and the machine tools.

A combination tool sharpener with emery, oilstone and felt wheels is a necessity in every pattern shop. The spectacle of patternmakers walking to the machine shop to grind their tools or using a cheap, home-model type of grinding wheel is not edifying. Sharpening of tools should be as easy as possible for the patternmaker since sharp tools are cheaper to use than brawn. Tool holders should be provided to assure the sharpening of plane bits and chisels at the best angle of about 22 to 25 degrees. Honing should be at the same angle.

The patternmaker's complete tool kit will represent an investment of about $150. Many patternmakers do not have complete kits. The progressive shop might well give prizes in the form of tools for various accomplishments such as steady attendance, nontardiness and suggestions on improved methods. A set of hand tools should

include rip, crosscut, compass, and back saws; iron and various special planes; spoke shaver; chisels; gouges; boring tools; depth, scratch and panel gages; scribe; pocket rule; pencil, and bevel squares. A complete tool kit, with which the patternmaker is thoroughly familiar, is an easy way of reducing costs.

Good illumination in the pattern shop is necessary if working conditions are to be satisfactory. The relation of high intensity of illumination to reduced spoilage, faster work, lower accident rate, lower production costs and contented workmen has been shown so often that reiteration is not needed. Improved lighting is most easily obtained by washing windows, skylights, walls, ceilings, and electric light bulbs and reflectors. Dirt on vertical and sloping window panes can cut the transmission of outdoor light as much as 50 and 75 per cent, respectively. Dust accumulations on bulbs, particularly if assisted by greasy hands, can absorb 20 to 30 per cent of the light produced. A complete program of washing at least twice a year is desirable, and in any case every fall before cloudy days are prevalent.

Paint on interior walls and ceilings or roof of the pattern shop should be white. Reflection value, if new, should be 85 per cent, but 75 per cent if old and clean. Value drops rapidly as grime accumulates on the paint, or it discolors, until for a buff color it is 50 to 65 per cent and for gray 20 to 60 per cent. Labor cost of obtaining increased light by increased reflection and cleanliness can be shown to be more than justified by the increased effectiveness of electric current.

The local power company usually will co-operate without cost in taking foot-candle readings after the pattern shop has been cleaned. Intensity shown by the meter should range from 15 for rough work to 20 for medium work. At the benches, where fine work is done, the minimum intensity should be 50 to 100 foot candles.

Purchase of pattern shop lumber frequently is dominated by a purchasing agent whose sole criterion is price. There is really no excuse for this condition. In an article in the March, 1943, issue of THE FOUNDRY, E. T. Kindt presented a guide for the purchase of pattern lumber of quality. Depending on pattern requirements, northern white pine and mahogany are most commonly used. Maple is used for fragile parts or where rough usage is anticipated. Sugar pine, Quebec pine, and Idaho pine are not so good as pine from the northeastern and Appalachian states.

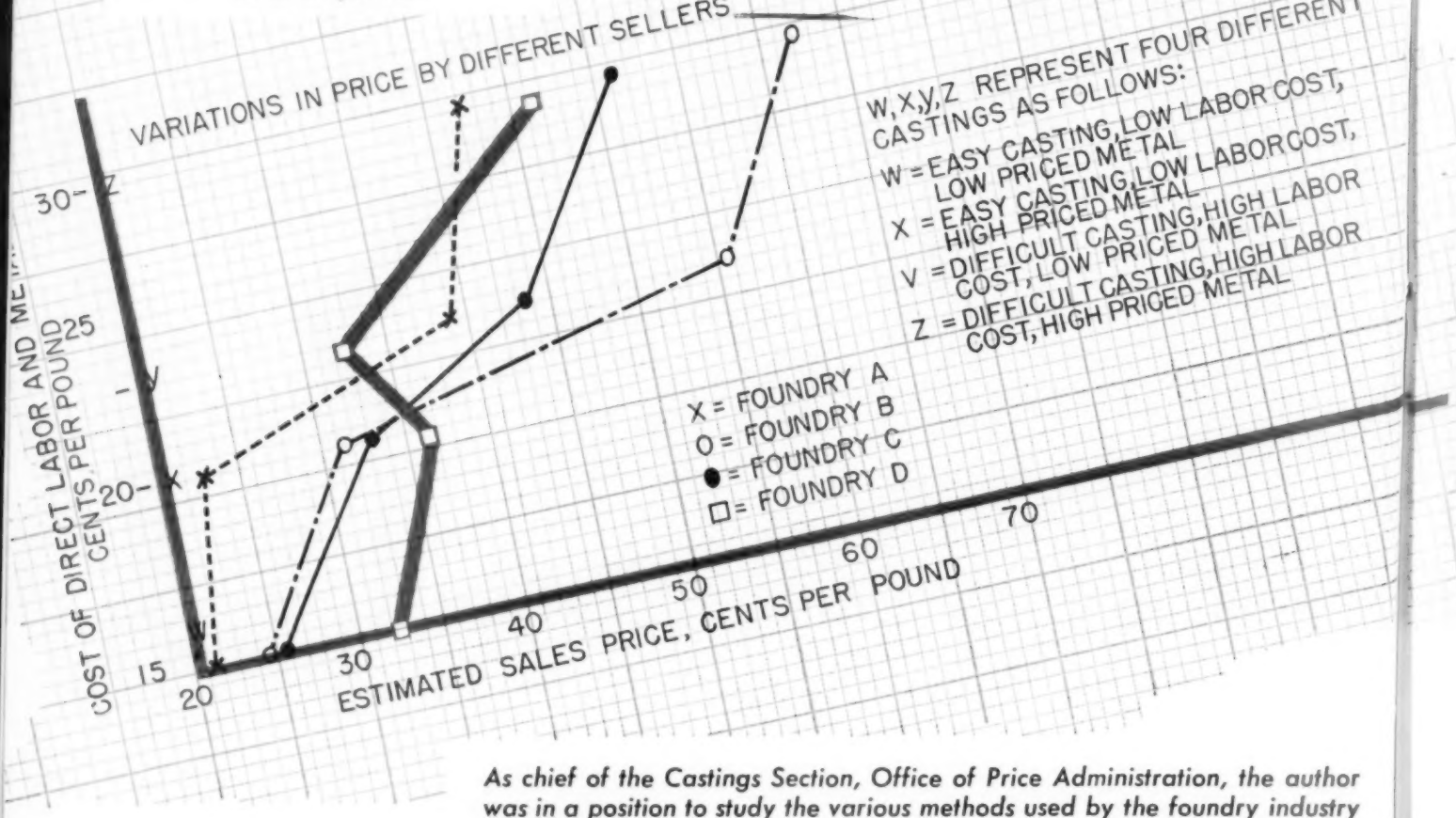
Every pattern shop should have a moisture meter to determine before use the moisture content of the lumber. A wet and dry bulb thermometer also should be installed to assist in keeping temperature in the pattern shop, particularly in winter, at about 70 F, and relative humidity from 40 to 60 per cent. Pattern lumber, if stabilized under those conditions, is said by Mr. Kindt to have about 10 per cent moisture content. Some authorities argue for lumber with a moisture content as low as 5 to 7 per cent.

Relative humidity in the pattern shop heated by steam radiators will generally be too low in winter as the air becomes too dry, and lumber in such a shop will dry out too rapidly on the surface. Sudden change of pattern lumber from cold to warm storage should be avoided.

Before issuance to the pattern shop drawings should be reviewed by a committee of three men representing the foundry, pattern shop and engi- (*Please turn to page* 215)

PRICING

Chart below shows variations in prices of different sellers. Foundries *A*, *B*, *C* and *D* are of comparable size, each with sales exceeding $600,000 annually. Between high and low estimate for same casting the minimum difference is 8 cents per lb or 28 per cent; maximum difference is 23 cents per lb or 67 per cent


VARIATIONS IN PRICE BY DIFFERENT SELLERS
W,X,Y,Z REPRESENT FOUR DIFFERENT CASTINGS AS FOLLOWS:
W = EASY CASTING, LOW LABOR COST, LOW PRICED METAL
X = EASY CASTING, LOW LABOR COST, HIGH PRICED METAL
V = DIFFICULT CASTING, HIGH LABOR COST, LOW PRICED METAL
Z = DIFFICULT CASTING, HIGH LABOR COST, HIGH PRICED METAL
X = FOUNDRY A
O = FOUNDRY B
● = FOUNDRY C
□ = FOUNDRY D
COST OF DIRECT LABOR AND MET... CENTS PER POUND
ESTIMATED SALES PRICE, CENTS PER POUND
15
20
25
30
40
50
60
70

As chief of the Castings Section, Office of Price Administration, the author was in a position to study the various methods used by the foundry industry in determining prices of castings. This is the first of two articles in which he discusses the good and bad features of these different methods

THIS ARTICLE is designed to cover the entire field of pricing methods and practices used by the various casting industries. The background of much of the material presented has been accumulated over the five years in which the writer has been in charge of casting prices at the Office of Price Administration, coupled with some twenty years of actual industrial practice. The field of castings covered includes gray and malleable iron, carbon and alloy steel, copper-base alloys, aluminum and magnesium. Certain rather specialized fields, such as plaster molding, investment molding and permanent molding, are not included and many of the characteristics cited are not applicable.

Despite all that the Price Control Act has done to make industry cost conscious too many foundries still are dominated by statements similar to: "We don't keep any records; my father ran this foundry for 35 years and he priced all the castings we made by looking at the casting; he knew from experience how much it would cost to make!" Unfortunately, many of these foundries grew to substantial proportions during the war while pricing methods remained the old size.

The accompanying chart gives some general idea of the effect on the quoted price of the pricing method of several foundries in about the same competitive area. A brief study of this chart shows the variation in prices that would be arrived at by these four companies.

As a guide in what the objectives should be and as a standard of comparison, an ideal pricing system is defined. It is realized that it would be extremely difficult to obtain this ideal in full, but it is to be desired and certainly should be used as a goal or objective.

An ideal pricing system is one which will provide for each identical casting a computed selling price sufficient to cover:

1. Actual cost of direct labor and material expended.
2. Overhead or burden calculated on an efficient utilization of available facilities.
3. Profit commensurate with the risk and technical difficulties encountered.

In the references and comments on pricing methods it is desirable to keep this definition in mind.

Pricing methods among different types of foundries vary somewhat. In general they compare as follows:

CASTINGS for profit

By JOSEPH B. MEIER
Washington

Steel and Malleable—The steel and malleable fields are relatively smaller than any of the others in number of establishments, excepting magnesium, and as might be expected, generally represent larger investments. This factor, combined with greater cost consciousness, has probably resulted in significantly better pricing methods. Industry-wide they represent by far the best pricing methods. This does not mean that individuals within these industries have not succumbed to poor practices, but that it is not generally true.

Aluminum—The aluminum foundries should really be considered in two classes, the foundries catering exclusively to aluminum castings, and the foundries selling other base alloy castings, principally copper.

Foundries selling aluminum castings exclusively are usually the larger foundries, but there are many smaller exclusively aluminum foundries. Many of the larger aluminum foundries have very good pricing systems, but during the war many smaller foundries pyramided into the large class with entirely inadequate formulas. Unfortunately, many of the larger foundries adopted the average price system, frequently to their later regret. The permanent mold operators usually had fairly comprehensive formulas but occasionally neglected the yield factor.

The smaller foundries selling both aluminum and copper base castings were, as a group, very negligent and mixed factors indiscriminately between aluminum and copper base castings or aluminum and iron castings, averaging on many occasions without relation to the facts. The quality of many of these systems was very poor.

Magnesium—The majority of magnesium foundries were started during the war. They were divided chiefly into two classes. One group was the flat price foundry making only aircraft parts and having one flat price for any and everything. The range between price and cost on individual items was unknown but probably ranged from 50 per cent loss to 75 per cent profit. Castings with a half-dozen complicated cores sold for the same price as a flat back. Toward the end of the war the fruit of this idea was working havoc on both price and production. This same condition was almost invariably true on the West coast and in the Southwest for aluminum aircraft castings. Newcomers picked up the easy jobs and left the tough ones for the boys with the know-how (?).

However, a very substantial group of the industry priced castings on a precise formula basis. The chief weakness in many of the formulas was due to the use of average metal and conversion cost factors in the computations.

The new producer in this field has extreme difficulty in establishing accurate costs because of this inexperience in making magnesium castings. He generally assumed costs somewhat relative to gray iron, aluminum or some other alloy he had been producing, only to find he was experiencing 75 per cent rejects, 60 per cent metal loss, and 10 or 15 per cent yield factors with resultant heavy losses instead of profits. It was not at all uncommon to have a former producer of castings start into magnesium casting production and propose to use a formula he had formerly been using for these other alloys. Usually he made a few changes such as the price of metal or a slight change upward in the profit factor.

Gray Iron and Brass and Bronze—It is hard to note much difference in these two industries' pricing practices. Relatively few companies in each metal have very good systems. A large percentage have grossly inadequate systems. Flat prices or average prices are common occurrences. Prices based on only weight factors are prevalent. Large numbers go no further than an estimate of molding time, average metal cost (including conversion cost) and a markup. While no figures were ever collected on gray iron, it is known that at one time 80 per cent of all the price adjustment cases in brass and bronze castings were "flat price" cases. Possibly because of the relative cheapness of gray iron compared with copper or aluminum, metal loss and yield almost always are lumped into one figure in gray iron.

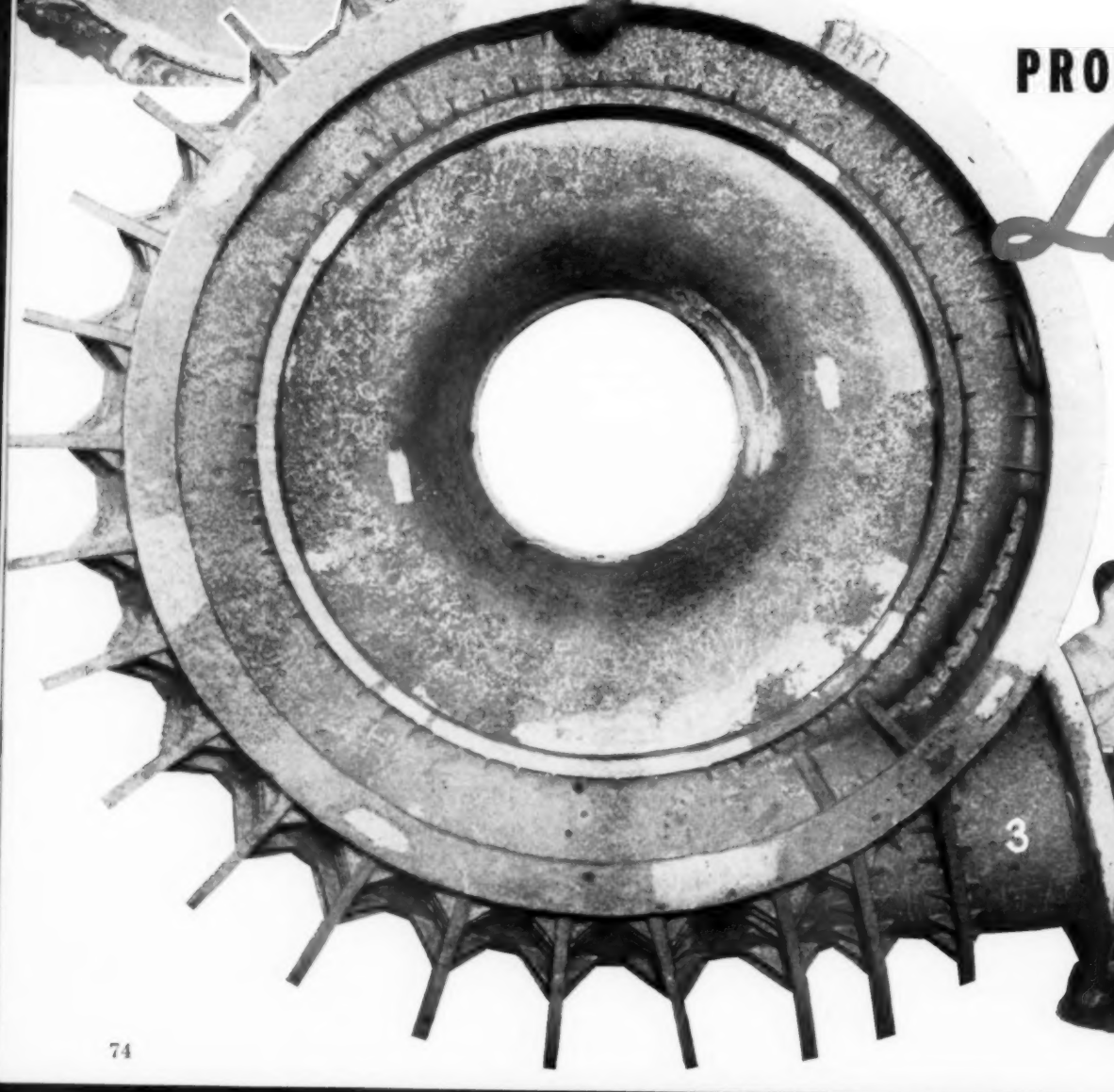
It is the author's opinion that close to three-fourths of the pricing methods in these two groups are not only inadequate but dangerous to the stability of the industries.

With this brief introduction let us look at the various types of pricing methods in general use.

The "Ameba" Formula—The "ameba" is defined as one of the simplest forms of life. Since this type of formula is the simplest form conceivable of a pricing method—if such it can be called at all—I have named it the "Ameba" system. This system usually has its origin in the dim past. "My father always priced castings this way so we have followed him," is a usual type of report. It consists essentially of discovering, if possible, what the buyer is now paying, reducing this by one-half cent or so a pound and thereby establishing the price. It usually covers the entire product line of the customer and makes no distinction in quantity, complexity or even alloy. Various ingenious schemes are devised for making it hard for the competitor to "nose in" on the deal. One device is to split the quotation into two prices, 10c per pound for 25 pieces or more, 11¼c per pound for less than 25 pieces. The ¼-c, of course, is intended to indicate to the buyer great precision in the determination of the price by the seller.

Another variation is one which was common in the aircraft industry around Los Angeles before and during the war. All airframe castings (no other qualification as to quantity, complexity, heat treatment, etc.) $1.15 per pound, except all castings under ¼-lb are 25c each. Another system involves a monumental segregation of costs by relating prices to the price of the alloy, plus a fixed price per pound of say 10c. (*Please turn to page* 178)

PRODUCING Large



ACCOMPANYING illustrations in a general way indicate the facilities, equipment and technique available for producing large, heavy steel castings in the Bethlehem, Pa., steel foundry of the Bethlehem Steel Co. An ample supply of metal is available at all times from a battery of six open-hearth furnaces with capacity varying from 17 to 80 tons. The furnaces, located in one section of the long building, are operated continuously. Steel from this melting unit is also used for the production of ingots. In the majority of instances one ladle is employed to pour a single casting or a number of castings, but occasionally two or more ladles are necessary. Several years ago the contents of six overloaded furnaces were combined and poured into a single casting with a gross weight of 290 tons, net weight 230 tons, which is claimed to be the heaviest steel casting in existence. Interesting features in connection with the production of this casting, a platen for a hydraulic press capable of exerting a pressure of 14,000 tons, were presented in the Sept. 1, 1931, issue of THE FOUNDRY.

For several reasons, including the convenience of pouring metal through a nozzle in the bottom of the ladle, large molds are made directly in pits in the floor, or made in flasks in the usual manner on the floor, and then lowered into a pit for casting. One of the long pits, 10 ft

deep, 20 ft wide and 100 ft in length, has a concrete wall 12 in. thick reinforced on the inside by a covering of steel plates. Gaps in the side walls, 5 ft apart, provide anchorage for steel partitions or bulkheads by which definite longitudinal space is assigned to any given mold. Heavy steel loops flush with the top of the wall, and with the lower ends attached to bottom plates, provide an anchorage for the binder bar bolts which lock the assembled mold into a solid unit capable of resisting the immense pressure exerted when the mold is filled with molten metal.

The mold shown in Fig. 7 and the resulting casting shown in Fig. 6 formed part of a hydraulic installation on a far western power and irrigation project. A multiplicity of large feeding heads, also padded areas on the flanges under the risers, were needed to insure the production of a clean, solid casting free from interior defects of shrinkage, porosity or gas holes.

A skeleton pattern was employed for making mold and core at the same time. With the lower half of the pattern properly leveled, sand was rammed around the outside up to the parting line. Sand was packed between the ribs of the pattern and contoured to shape with a short strike riding on the ribs. The shape was extended at each end opening to form a core print and a suitable pedestal erected to engage and support the ring on the end of the core arbor. The core arbor, made up of a substantial flat frame and a number of semicircular bars, was lowered into the pattern and rammed full of sand up to the parting line. The upper part of the arbor was bolted to the lower half and the upper part of the pattern was adjusted in place. Sand was rammed in and around the arbor until the entire space was filled. The surplus sand was scraped off flush with the *outside* of the skeleton pattern, except at the ends where it was scraped off flush with the *inside* and also flush with the circular plate which formed the end of the core print on the arbor. A quantity of coke in the center of the core was extended to reach vent openings in the print end plates.

The cope was rammed, lifted off and set up on suitable stands for finishing, nailing, painting with silica wash and drying. Short strikes were employed to remove a thickness of sand from between the ribs of the pattern. The thickness corresponded to the desired metal thickness of the proposed casting. The upper part of the pattern was removed and the top half of the core was lifted off and placed in the oven to be dried. The lower half of the core then was lifted out and also placed in the oven. After the required thickness of sand was removed from between the ribs, the lower half of the pattern was removed from the mold. Then the mold was finished, nailed, painted with silica wash and dried, the cores were lowered into place, the cope was set on and the mold was bound together with long binder bars. Sand was rammed behind the core prints and suitable openings left for escape of the vent. Runner and risers were built up to the required height and then the mold was filled with metal.

A pump casing, 12 ft in diameter, gross weight 68,000 lb, net weight 48,000 lb, shown in Fig. 3, presented many interesting features because of the shape, size and the wide variation in section thickness in several areas. Elaborate bracketing was required, especially at the junction of the projecting outside members with the main body. Internal chills were employed extensively to equalize the cooling

Steel Castings

By PAT DWYER
Engineering Editor
THE FOUNDRY

This is one of a series of articles describing various casting facilities of the Bethlehem Steel Co. It discusses equipment and technique employed in producing large steel castings

Fig. 1 — Preparing mold for cinder pot. Cheek flask sections and pattern are in place

Fig. 2—Bottom plate and core cone are in place in this view of cinder pot mold

Fig. 3—Pump casing, 12 ft diameter. Gross weight 68,000 lb, net weight 48,000 lb

Fig. 4—Roll molding operation, using sweep as pattern

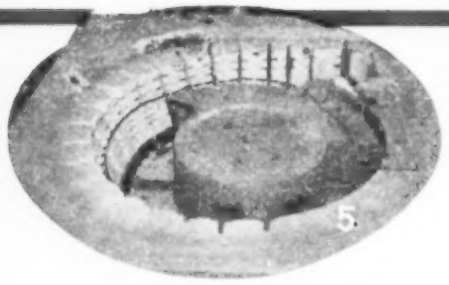


Fig. 5 — Mold for the pump casing shown in Fig. 3

speed rate between thick and thin sections. Size, shape, number and position of the various internal chills are shown in Fig. 5, a view taken of the lower part of the mold in a partly assembled condition.

A sheave wheel for a vertical lift bridge, 16 ft, 2 in. diameter, 32-in. face, gross weight 83,000 lb, net weight 60,500 lb, is shown in Fig. 8. The mold for the casting in a partly assembled condition is shown in Fig. 9. From the regularity and uniformity of the brackets, it is apparent that this feature of foundry practice is not left to the whim or individual judgment of the molder. The brackets are attached in the pattern shop and form a recognized part of the pattern equipment.

The bottom face and the outside face were formed by the pattern, while the remainder of the mold was formed with dry sand cores, one set of cores to form the *H*-shape arms, and a second set to serve as a cover or cope. An extra flange on the top rim of the pattern formed a core print or seat for the outer ends of the cover cores. The lower flange on the pattern was in sections, attached temporarily to the main pattern and removed after the pattern was drawn out of the mold. Inside of the arm cores was filled with coke leading to a vent opening in the center of the top face. A continuation of this vent was carried through the covering cores. A large riser opening was provided in each covering core over the junction of rim and arm. The hub opening in the center was extended upward full size. A sprue on the outside of the rim delivered metal to a horizontal tile runner under the mold from which metal entered the hub through two vertical gates, one on each side of the bottom center core print. Internal chill rods were placed in the lower part of the radial arms and in the heavy rim. Extension to the various risers was in green sand in a cope which covered the entire mold and which was held down by long binder bars.

Special pit, pattern and flask equipment are employed in the constant production of a slag ladle casting for use at the blast furnaces. It is molded bottom up, the opposite position to that assumed in service. The drag flask and core cone as a single unit remain permanently in the bottom of the pit, while the cheek flask and cope in several sections are lifted on and off in the process of making the mold and stripping the casting. Flask and cone are tapered to minimize the amount of sand to be handled. The drag has an extension pocket at one point for the accommodation of the vertical sprue connected by tile runner to gates which deliver metal into the bottom of the mold. The remainder of the sprue is formed inside a small special flask, later attached to the drag according to the technique employed in the production of chill and sand cast rolls in iron foundries.

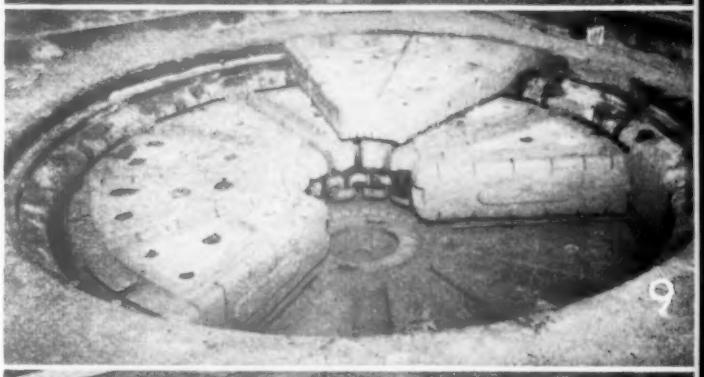
After the drag is rammed full of sand and scraped off flush with the joint to form a parting surface, the wood pattern is lowered into place over the cone. The first section of the cheek, provided with a number of short chuck bars, is set in place around the pattern and rammed full of sand. Dry sand cores are adjusted in place to form the flanges, brackets and trunnions. Succeeding sections of flask, steadily growing smaller in diameter, are rammed full of sand up to a point on the pattern where the arched top begins. Sand then is rammed in the space between the pattern and the upright metal cone pierced all over the surface with 1-in. diameter vent holes on 6-in. centers. The cap piece on the pattern is open to permit ramming the remainder of the core. With the other flask sections, including a barred cope, in place the remaining space around the outside of the pattern is rammed full of sand. A 12-in. diameter riser 18 in. high is erected on the center, or highest point of the pattern.

The combination cheek and cope is lifted off and placed on suitable supports on any convenient clear floor area. That in itself sometimes is a problem in a shop crowded to capacity with work. After the faces of the mold and core have been finished, nailed and covered with a coating of silica wash, the outer part of the mold is lowered over the inner part to a point within a few inches between

the flanges. Distance blocks resting on the drag flange support the cope in this position for several hours while hot air is blown into the mold. The dried mold then is closed, clamped and filled with metal.

Reasons why the slag ladles in the iron foundry are cast bottom down, while ladles in the steel foundry are cast bottom up are too long to present here, and anyway they lie outside the scope of the present discussion, which is concerned principally with operating detail.

Manufacture of rolls, solid, cylindrical blocks of metal with straight or grooved faces employed in rolling mills, is one of the specialized branches, if not the most highly specialized branch in the foundry industry. This applies more particularly to the metallurgical features, analysis, composition and heat treatment. Full patterns are employed for molding many of the smaller sizes, particularly standard models, or those made in considerable numbers and regarded as fairly steady running jobs. Larger sizes are made with sweeps in half (*Please turn to page* 224)



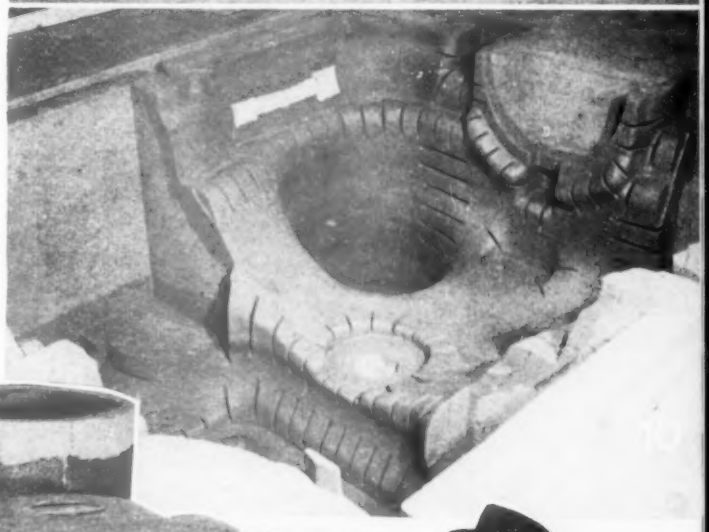


Fig. 6—Casting for installation in Boulder Dam hydraulic power plant

Fig. 7—Mold for making the casting shown in Fig. 6

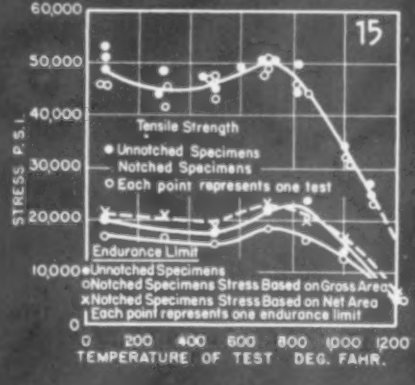
Fig. 8—Cast sheave wheel for vertical lift bridge is 16 ft 2 in. in diameter with 32-in. face. Gross weight 83,000 lb, net weight 60,500 lb

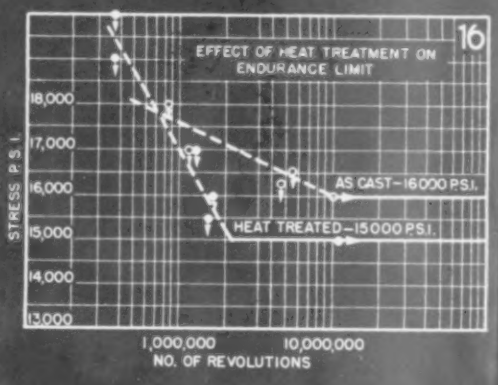
Fig. 9—Mold for casting sheave wheel shown in Fig. 8

Fig. 10—Mold in which turbine casing shown in Fig. 11 was poured

Fig. 11—Turbine casing measures 11 x 12½ x 5 ft. Gross weight 95,000 lb

Fig. 13—Izod type testing unit. Fig. 14—Crankshaft material fatigue test specimen. Fig. 15—Strength-temperature curves. Fig. 16—Curve showing heat treated cast iron endurance limit inferior to as-cast iron. Fig. 17—Fatigue specimen in position for test. Fig. 18—Charpy type impact specimens—finish machined, broken ends, bent specimen





By JAMES S. VANICK
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New York

Tests of cast iron

This is the second of two articles describing unusual methods that have been used for testing cast iron. It is based on information assembled by Committee A-3 of the American Society for Testing Materials

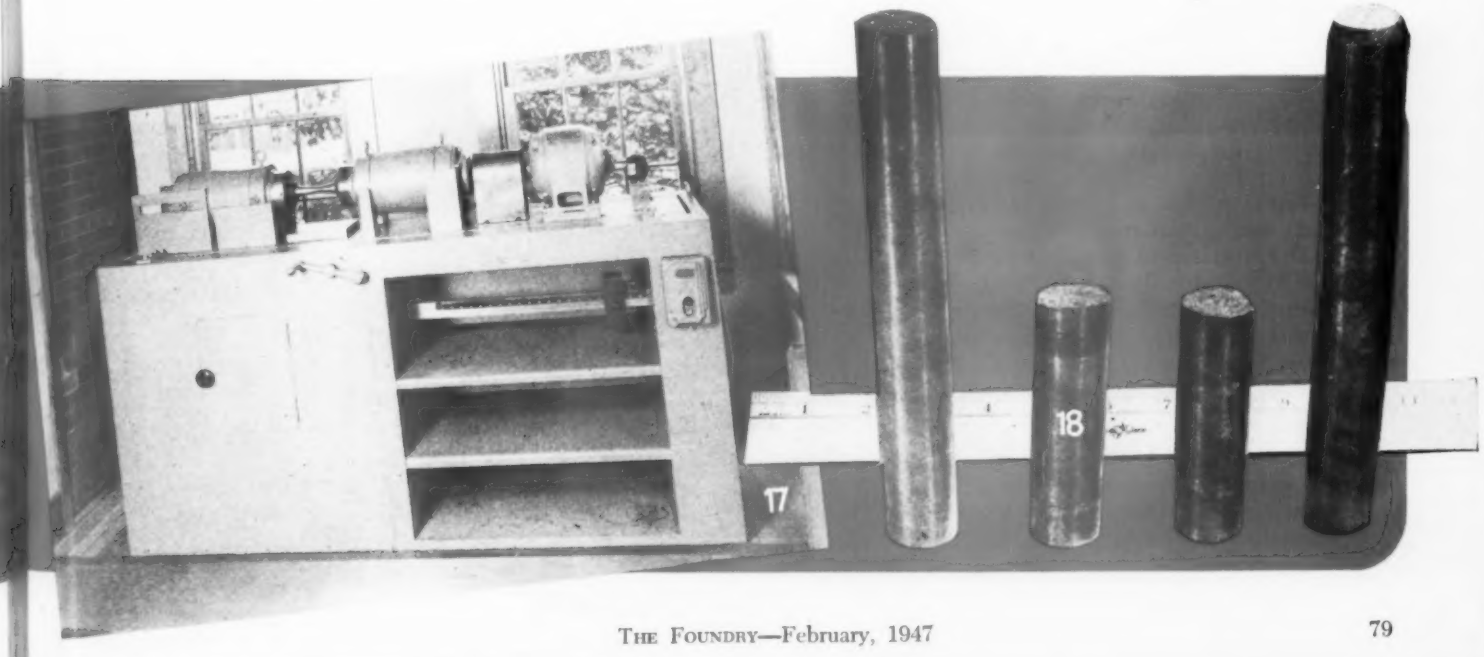
FATIGUE TESTING: Many castings are subjected to repeated stresses in the course of their careers, and some general information upon the fatigue strength of cast irons becomes helpful to their application. Fatigue testing of cast iron has not been standardized. Cast irons are usually tested in specimens cut from the arbitration test bar or its American Society for Testing Materials Specification A-48 Type B equivalent (see Table IV, THE FOUNDRY, January, 1947). The dimensions of specimens shown in item No. 8 of Fig. 24 of the American Hammered Piston Ring Co.'s collection of test pieces, illustrates a typical series.

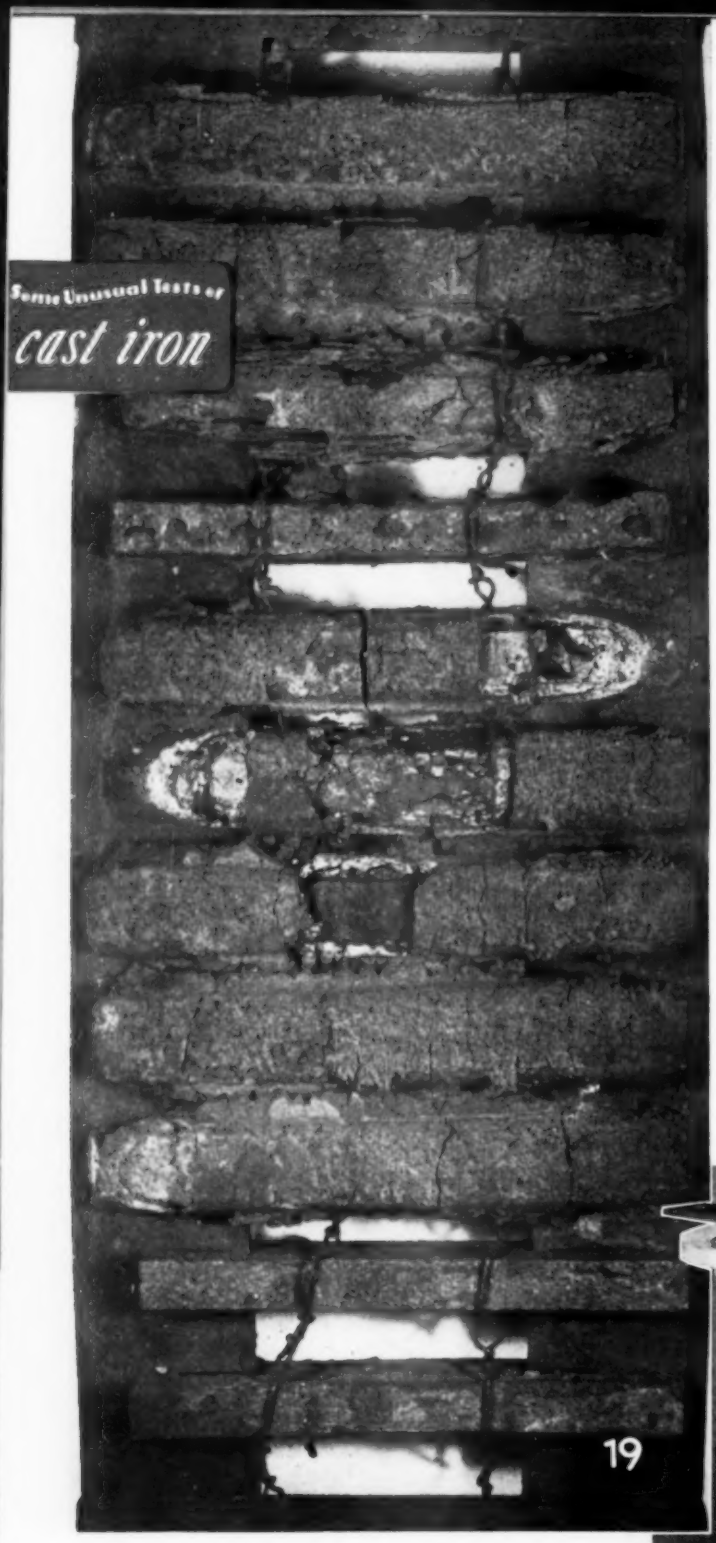
Specimens shown in Fig. 12 indicate similar types of specimens and illustrate a special case of studying notch effects or drill hole effects. These specimens also were used for elevated temperature tests of notched-vs-smooth surfaces. Fig. 15 from the work of Collins and Smith[6] indicates that the endurance limit at elevated temperatures was not appreciably altered by the type of notch made in the test specimens. The time period in these tests presumably did not exceed 100 hours of exposure to heat. Some reference to long term exposures of cast iron to elevated temperatures follows in the section on "Heat Resistance."

In the work at the Cooper-Bessemer Corp. on crankshafts of large cross section, a correspondingly greater cross-sectional area was desired in the test specimens, and a specimen measuring 1 in. in diameter at the reduced section, and 9 in. long, as shown in Fig. 14, was used. Fig. 17 shows its position in the testing machine assembly. These specimens were removed from experimental crankshafts or crankshaft extensions. Typical results are abstracted in Table VII from data published by Eagan[7]. Fig. 16, from the same source, shows that heat treatment does not improve the endurance limit.

Along with the fatigue test, the impact test which is described in the following text, provides data upon the ability of cast irons to function successfully in applications such as crankshafts and other repeatedly stressed parts.

(G) Impact Testing: Crankshaft castings were among the first cast iron products made to need some test for obtaining a measure of their toughness. Subcommittee XV of ASTM Committee A-3, under the chairmanship of J. T. MacKenzie, has been studying for some time the problem of developing a test specimen suitable for the impact test[8]. Several laboratories have developed new methods of impact testing that yield comparable results by slightly different means. The American Foundrymen's Association handbook on *Alloy Cast Irons* contains correlations be-





tween the Izod, Charpy, single-blow and repeated-blow tests as measured by G. P. Phillips and reported in his work[9].

A number of testing methods reveal differences in degree of toughness without applying an impact blow, but the desire to measure impact toughness inevitably leads to some kind of impact test. Years ago, F. S. Shipley at the Caterpillar Tractor Co. prepared specimens which were cut from the ASTM 1.2-in. diameter Type B Transverse Test Bar. Specimens were cut to an 8-in. length and machined on a centerless grinder to a diameter of 1.125 in. They are tested on a Charpy type impact machine on 6-in. supports using a hammer of 120 ft lb capacity. The material must exceed a 60 ft lb impact test, and occasional test bars are able to stop the hammer without breaking, indicating a toughness exceeding 120 ft lb. Composition of the material is as follows: TC 3.00-3.20 per cent, Mn 0.80-0.90 per cent; S 0.14 max, P 0.075-0.10 per cent, Si about 2.10-2.25 per cent (1.60 as tapped), Ni 1.50-1.75 per cent, Mo 0.80-0.90 per cent, Cr 0.10 per cent max.

Fig. 18 illustrates a machined specimen ready for test; the broken ends of two tested specimens, and an unbroken tested specimen at the right, in which a slight bend can be detected at its middle and the indentation marks from the impact with the hammer, can be seen. This last specimen withstood the full 120 ft lb blow of the impact hammer.

The International Nickel Co. has employed the Izod impact test and used unmachined specimens fastened in a specially designed holder and subjected to a specially designed hammer which delivers a 120 ft lb impact blow (see Fig. 13). The details of the design have not yet been published, but are available. The results of tests upon typical cast irons varying widely in composition and purpose are summarized in Table VIII.

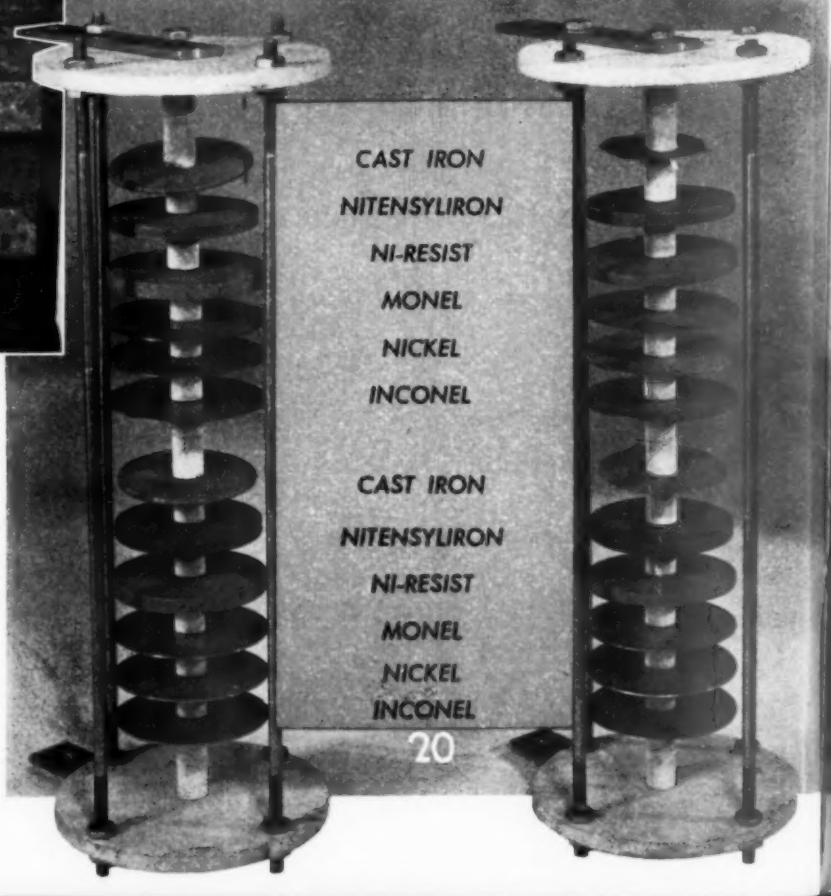


Fig. 19—Test rack after six-months' exposure to powdered coal combustion atmosphere at 1500-1700 F. Materials from top to bottom are: Type 1 Ni-Resist; Type 4 Ni-Resist; Type 5 Ni-Resist; Type SR Ni-Resist; cast iron; grate bar iron A-1; stove iron A-2; firebox iron A; firebox iron S; HR steel (18 per cent Cr, 8 per cent Ni); HR steel (25 per cent Cr, 12 per cent Ni)

Fig. 20—Corrosion test specimens after exposure to soap manufacturing chemicals. Left: Exposed to hot vapor fatty acids. Right: Exposed to hot liquid fatty acids

In the International Nickel Company test method, the hammer strikes the specimen at a distance of 3 in. above the grips, thus to some extent simulating the striking position upon the Charpy impact specimen used by the Caterpillar Tractor Co. but differing in that the 6 in. apart two-point support of the Charpy bar provides a simple beam test, whereas the International Nickel Co. specimen provides a cantilever beam test.

The British Cast Iron Research Association has also developed a test method resembling the International Nickel Co. method but using a machined test bar which is reduced to a diameter of 0.798-in. to provide a cross-sectional area of 0.50 sq in. It is broken at a distance of 22 mm from the supports, thus mixing in the metric and English system of length measurements. The results from tests upon it should parallel those obtained in the International Nickel Co. Izod test or, for that matter, fall into a position paralleling those outlined in Phillips' correlation of Izod and Charpy impact tests.

Flinn and Chapin[10] report results upon Charpy type specimens 0.707 in. square and 4 in. long, broken on supports 3.25 in. apart. Values of 5 to 10 ft lb were obtained upon alloyed, white cast irons.

Until the problem of designing an impact test and specimen can be solved, engineers may need to continue the prevailing practice of using such specimens as are convenient for their testing equipment and sufficiently dependable to meet their special needs.

(H) Corrosion Testing: Methods of corrosion testing have been the subject of considerable debate in ASTM committees. Efforts have been made to make the test simulate the type of corrosion encountered. An ingenious method of testing cast iron specimens in industrial liquids or vapors has been developed by members of the International Nickel Co. staff. The procedure consists of assembling discs of the different materials on a central shaft to form a spool. The spool is made up of a corrosion resisting frame of Monel metal or Inconel, and the shaft which is in contact with the specimens is covered with bakelite sleeves for low temperature exposures, or porcelain sleeves and sleeve separators for high temperatures, to insulate the specimens from galvanic action. At least eight specimens can be accommodated, and as many as 16 have been fitted into a spool. The machined specimens are designed to possess an area of 0.50 sq. dm, so that after testing, the following formula: Weight loss in mg × 2/No. of days will equal mdd. This is a typical ASTM corrosion term abbreviating the units mg/sq. dm/day.

Shown in Figs. 20 are 12 specimens representing six different metals which have been tested in duplicate. The results of the corrosion test in this particular case are shown in Table IX.

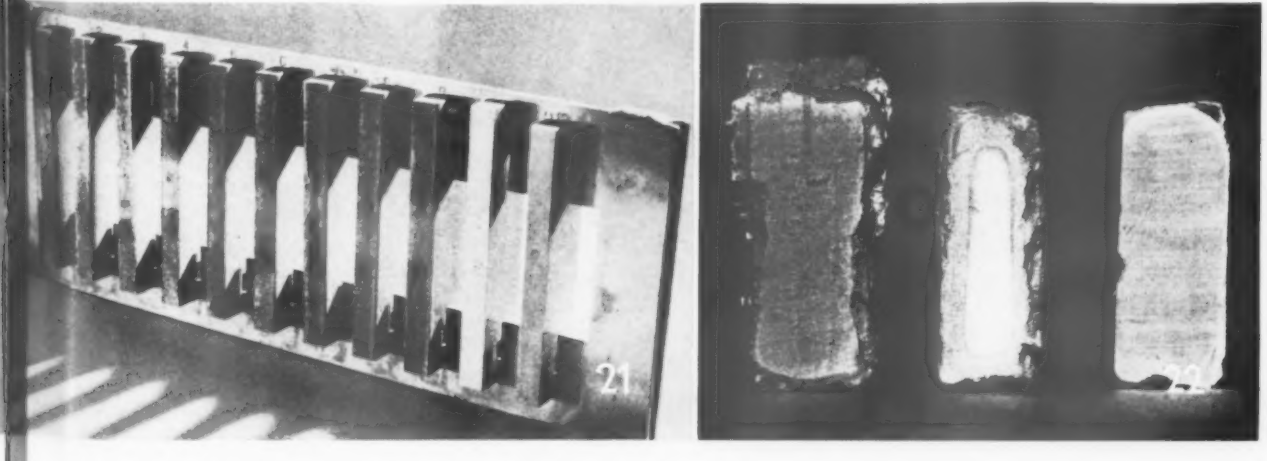
Many other types of corrosion specimens and methods of testing are in use to meet the specific needs or convenience of the individuals interested in the test. For example, the American Petroleum Institute prefers for cast iron a specimen measuring approximately ¼ x 1 x 6 in. Fig. 24 (Specimen No. 9) shows another specimen used by the American Hammered Piston Ring Co.

(I) Heat Resistance Tests: Many factors enter into the destruction of metals at elevated temperatures. Among them are the temperature level and character of the enveloping atmosphere; whether the heating periods are long or short and sudden or slowly applied, and whether or not motion, erosion or stagnation are involved. In some respects these qualifying factors resemble those operating in the case of the corrosion tests.

Messrs. Geiger and Sefing of the International Nickel Co.'s technical staff have devised a test rack, shown in Fig. 21, which is suitable for testing metals in various industrial atmospheres under operating conditions. These test racks or "xylophones" may be fastened to furnace walls, furnace fixtures, retorts, pots or other elevated temperature equipment and allowed to remain for various lengths of time to establish the rate and degree of damage. Fig. 19 illustrated the appearance of a test rack after a six-month exposure to firebox atmospheres in a power plant in which powdered coal was used as fuel. Measurements of the depth of penetration, and records of the appearance of the specimens can be made after periodic or final exposure. In this case, furnace atmospheres of 1500-1700 F were involved. Fig. 22 illustrates additional results from the test

Fig. 21—"Xylophone" type test rack with nine cast iron and two heat-resisting steel specimens for exposure to elevated temperature atmospheres

Fig. 22—Deterioration penetration in three specimens of Fig. 19. Type 1 Ni-Resist (left) has oxide outer shell, deteriorated middle and core. Type 4 Ni-Resist (center) has thin outer shell, deteriorated mid-section, sound core. Type SR Ni-Resist (right) has thin outer skin, large and sound interior core. Cast iron (not shown) was solid lump of oxide residue



and shows the contrast between unaffected core metal and the shell of deteriorated outer metal. From tests like this, a much closer approximation of the damage to cast iron under operating conditions can be derived than can be obtained through the customary laboratory test.

Some Unusual Tests of *cast iron*

(J) **Special Tests:** Special tests for castings as widely divergent as piston rings and crankshafts have been developed by foundries producing these castings. Reference has already been made to the impact and fatigue test specimens used in the laboratories of the Cooper-Bessemer Corp., Caterpillar Tractor Co. and International Nickel Co.

At the laboratory of the American Hammered Piston Ring Co., Baltimore, Tracy C. Jarrett and his associates have devised specimens for testing piston ring metals for tensile strength, modulus of elasticity, endurance, expansion, damping, corrosion and wear. Fig. 24 sketches the contour and dimensions of some of the specimens used.

Tension specimens No. 1, 2, 3 and 4, as well as fatigue specimen No. 8, are made in cross-sectional thicknesses of 0.125 to 0.50-in. While all specimens show the effort that has been made to measure the properties of cast iron in thin sections, specimens 3, 4, 6 and 9 are particularly selected to develop the properties of actual piston ring castings. Specimens 5, 6 and 7 represent special types used to round out the system of testing to determine the important but less commonly discussed properties of piston ring cast iron. Specimen 5 is typical of the one used on the Norton type of damping capacity tester. The damping capacity of cast iron parts may become an important factor in the functioning of piston rings. Some measurement of the degree of vibration-absorbing power possessed by specific compositions would be generally useful.

The dilatometer specimen (No. 7) provides a means for measuring the dimensional changes that occur upon heating or cooling. This specimen, with the furnace and apparatus associated with it, develops a chart of changes in length that occur during heating and cooling, thus revealing information of value to both the designer and the metallurgist.

Fig. 25 illustrates the appearance of test castings which are used to provide specimens that are later tested to determine the various important properties of the metal.

The wearing quality of piston rings is an important property, and the specimen shown in Fig. 23 illustrates the type of test piece used at the American Hammered Piston Ring Co. This specimen, after careful preparation, is subjected to dry rubbing action against a standard cylinder of material that conforms in composition, properties and surface finish to automotive engine liner material. The cylinder or drum revolves while the specimen is pressed against its surface in the "brake shoe type" of test. Fig. 26 illustrates the test assembly. Unit pressure at the surface lessens as the drum wears a gutter into the flat specimen. "Weight loss per hour" is used as a measure of the wearing rate. The results of tests of this kind have been reported in a number of technical papers.

Appendix: Credit for stimulating the interest in novel methods for testing cast iron should go to the American Society for Testing Materials and to Dr. J. T. MacKenzie, chairman of its Committee A-3 for his help. Members of the committee, who may have been named in the text, and others who deserve honorable mention for their contributions are: Prof. W. Leighton Collins, University of Illinois; Dr. R. A. Flinn, American Brake Shoe Co.; A. P. Gagnebin, International Nickel Company Inc.; Dr. Tracy Jarrett, American Hammered Piston Ring Co.; T. E. Eagan, Cooper-Bessemer Co.; F. S. Shipley, Caterpillar Tractor Co.; L. K. Eyde, O. S. Peters Co.; F. G. Tatnall, Baldwin Southwark Division, Baldwin Locomotive Works.

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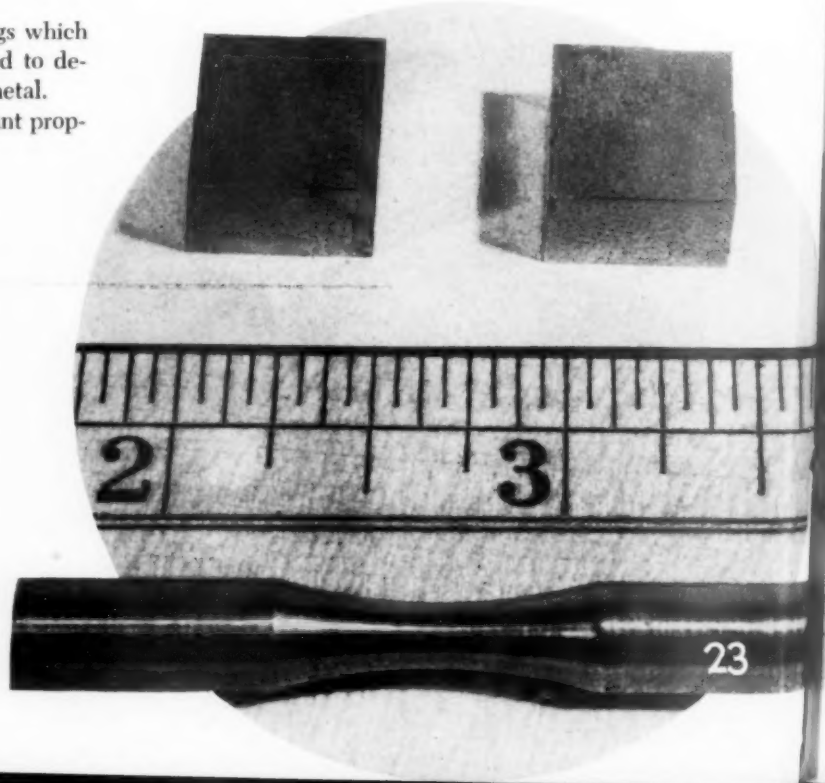


Fig. 23—Top: Piston ring wear test specimens. Bottom: Fatigue test specimen. Both are for use on Krause high-speed testing machine

Fig. 24—Specimens designed by American Hammered Piston Ring Division for testing piston ring materials

Fig. 25—Specimen castings corresponding to piston ring cross sections. Left and right: Individually cast piston ring type test casting. Top: Damping capacity test specimen. Center: Test bars for tensile tests machined from test castings

Fig. 26—Wear testing machine showing specimen of piston ring iron riding the drum

TABLE VII—Fatigue Test Results for Heavy Sections (2¼" Thickness) Ni-Cr-Mo Alloyed Gray Iron

Heat No.	Chemical Analysis, % TC	Si	Mn	P	S	Ni	Cr	Mo	Condition	Tensile Strength, psi	Endurance Limit, psi	Brinell Hardness	Ratio, Endurance Limit: Tensile Strength	Increased by Heat Treatment, % Tensile Strength	Increased by Heat Treatment, % Endurance Limit
3364	3.06	1.40	0.91	0.11	0.071	1.54	0.30	0.49	As Cast	46,800	16,000	197	0.34		
3364	3.06	1.40	0.91	0.11	0.071	1.54	0.30	0.49	1600° F—2 Hr. (Oil) 1130° F—2 Hr. (Air)	65,400	15,000	255	0.23	39.8	—6.2
3397	3.09	1.74	0.93	0.068	0.051	1.40	0.28	0.58	As Cast	52,000	17,000	207	0.33	...	...
3397	3.09	1.74	0.93	0.068	0.051	1.40	0.28	0.58	1600° F—2 Hr. (Oil) 1025° F—2 Hr. (Air)	79,750	15,500	293	0.20	53.3	—8.8
3913	2.94	1.32	0.99	0.089	0.055	1.39	0.30	0.50	As Cast	49,000	16,500	217	0.34	...	...
3913	2.94	1.32	0.99	0.089	0.055	1.39	0.30	0.50	*	58,500	16,500	277	0.28	19.5	None

* 1600 F—10 hr, quenched oil to 900 F. Held at 900 F—16 hr. Air cooled.

TABLE VIII—Izod AB Impact Properties of Typical Alloyed Irons

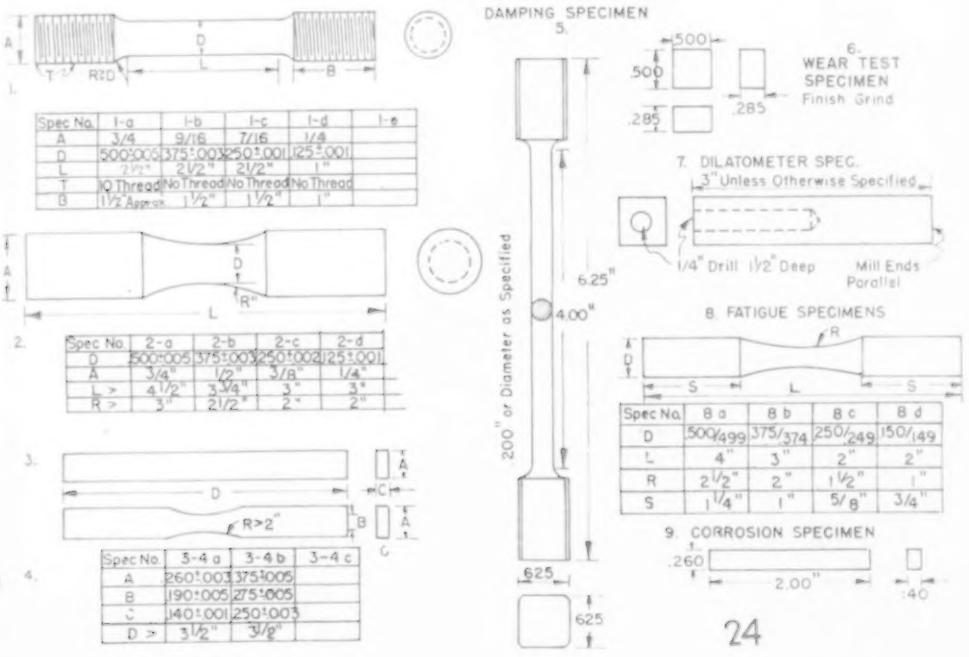
Type	Composition TC	Si	Mn	Ni	Mo	Cu	Cr	Impact Ft Lbs
Martensitic Gray Iron	2.90	1.60	0.60	15.00	0.60	6.00	2.00	73.0
Plain Gray Iron	3.25	2.20	0.60	....	....	....	....	17.0
Martensitic Gray Iron	....	*	....	....	....	....	....	**22.0**
Acicular Gray Iron	2.90	1.60	...	1.75	0.60	....	....	51.0
Ni-Resist	3.00	1.50	...	15.00	...	6.00	2.00	73.0
Ni-Hard	3.30	0.50	...	4.50	...	...	1.55	23.0

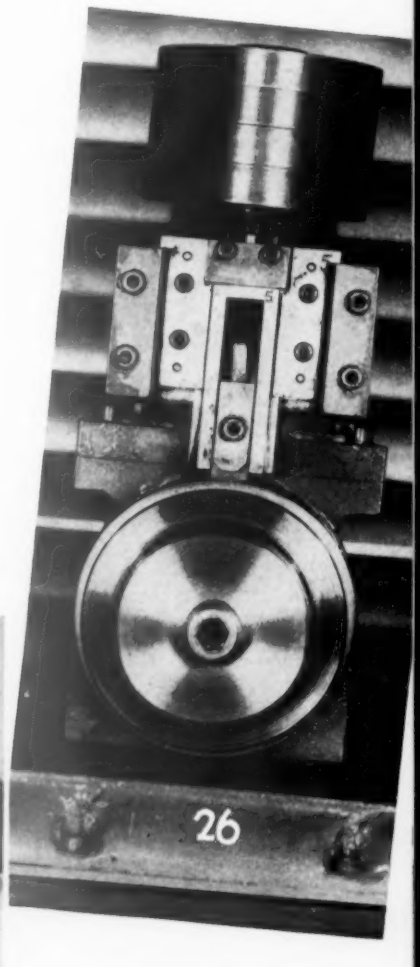
* This was a nickel-chromium iron heat treated at 387 bhn, by water quenching from 1650 F and drawing at 600 F for five hours.

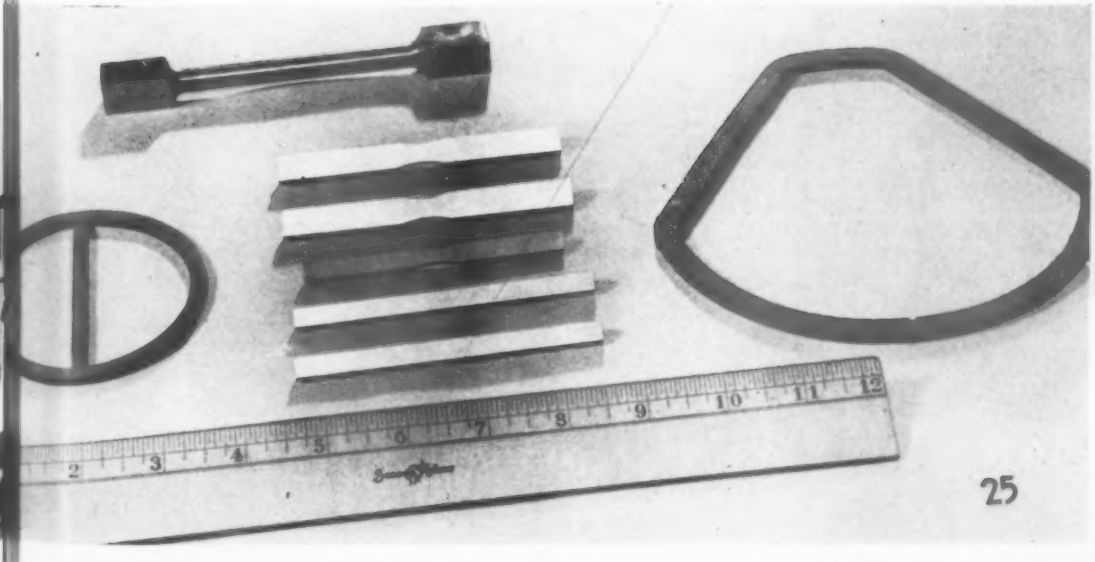
TABLE IX — Corrosion Rates from Tests in Soap Manufacturing Process

FATTY ACID DISTILLATION: 526 HOURS: DELIVERING 21 BATCHES

Metal	Vapor Space mdd	Vapor Space In./Yr	Hot Liquid in Still mdd	Hot Liquid in Still In./Yr
Cast Iron	4260	.850	5975	1.19
Ni-Tensyliron	1610	.324	3620	.722
Ni-Resist	134	.026	316	.061
Monel	84	.014	158	.026
Nickel	57	.009	84	.014
Inconel	10	.001	22	.004







Modern improvements in THE CHILLED C

By L. H. RUDESILL
Metallurgist
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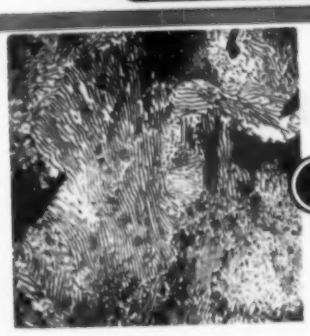


CAR WHEEL

Numerous developments have contributed to improvements in the chilled car wheel during the last several years. These are detailed here in a paper presented by the author before the Kansas City Car Foremen's Association, Nov. 6

THE chilled tread car wheel occupies the most responsible position in the railroad freight car mechanism and is the only part that has successfully performed its function without appreciable change of material or form during the evolution of cars of small capacity to those of enormous capacity in common use today.

Function of the wheel is to permit relative motion between the track and car body. It carries an enormous load at high velocity over long distances, both safely and economically. In addition to carrying the load, the wheel causes the truck to follow the alignment of the track, and when retardation is required, the brakeshoe is applied with heavy force to the wheel tread, thereby converting an enormous amount of mechanical energy into heat energy in a very short period of time.

The chilled tread car wheel has met these conditions so successfully that, today, it carries the commerce of America. It has maintained its supremacy through all the evolution from light wheel loads to the heaviest wheel loads that the rail can carry. The reason why chilled iron has been so popular is that it possesses more desirable qualities for wheel service than is possessed by any other metal. It is available everywhere at low cost, and therefore its economy is unapproached.

Griffin Wheel Co. for many years has maintained a progressive research program and in recent years, in coordination with the Association of Manufacturers of Chilled Car Wheels, has amplified and extended this program. This paper is designed to emphasize the most recent chilled car wheel developments and to express the value and adaptability of cast iron used in their production.

All metals have specific benefits in specific applications. Therefore, in the selection of one metal over another, one must take into consideration these benefits and their relation to service. All the physical properties and characteristics, such as ultimate strength, ductility, yield point, compressive strength, hardness and damping properties, must be considered as well as the fundamental matrix of a material. This point is made to bring out the fact that no one material can be considered better than another for a specific application until it is determined which material meets most of the important requirements and which is the most economical.

For years fictional writers, commentators and others, have been throwing stones at gray cast iron. The author of an article in a recent magazine of world-wide circulation described cast iron as "mere cast iron," when commenting on its use in agricultural machinery. There was a storm of protest from engineers and metallurgists pointing out the great value of cast iron to the nation's progress. Most of these rebuttals admitted that in former years there was a negligent attitude towards scientific developments in the cast iron industry, but also pointed out

Fig. 1—Air furnace-cupola duplexing units used to produce the special low carbon cast iron from which the wheels are made

Fig. 2—Photomicrograph of unannealed plate metal, left, shows coarse, dense pearlite structure. Annealed metal, right, shows modified pearlite structure and the presence of free ferrite

Fig. 3—Same tendencies are evident in the tread material. Unannealed, left, and annealed, right—the latter structure is finer but still retains original hardness

Fig. 4—Annealing ovens in which car wheels are heat treated for stress relief

Fig. 5—Pouring thermal test to determine if material is properly annealed and free of internal stress

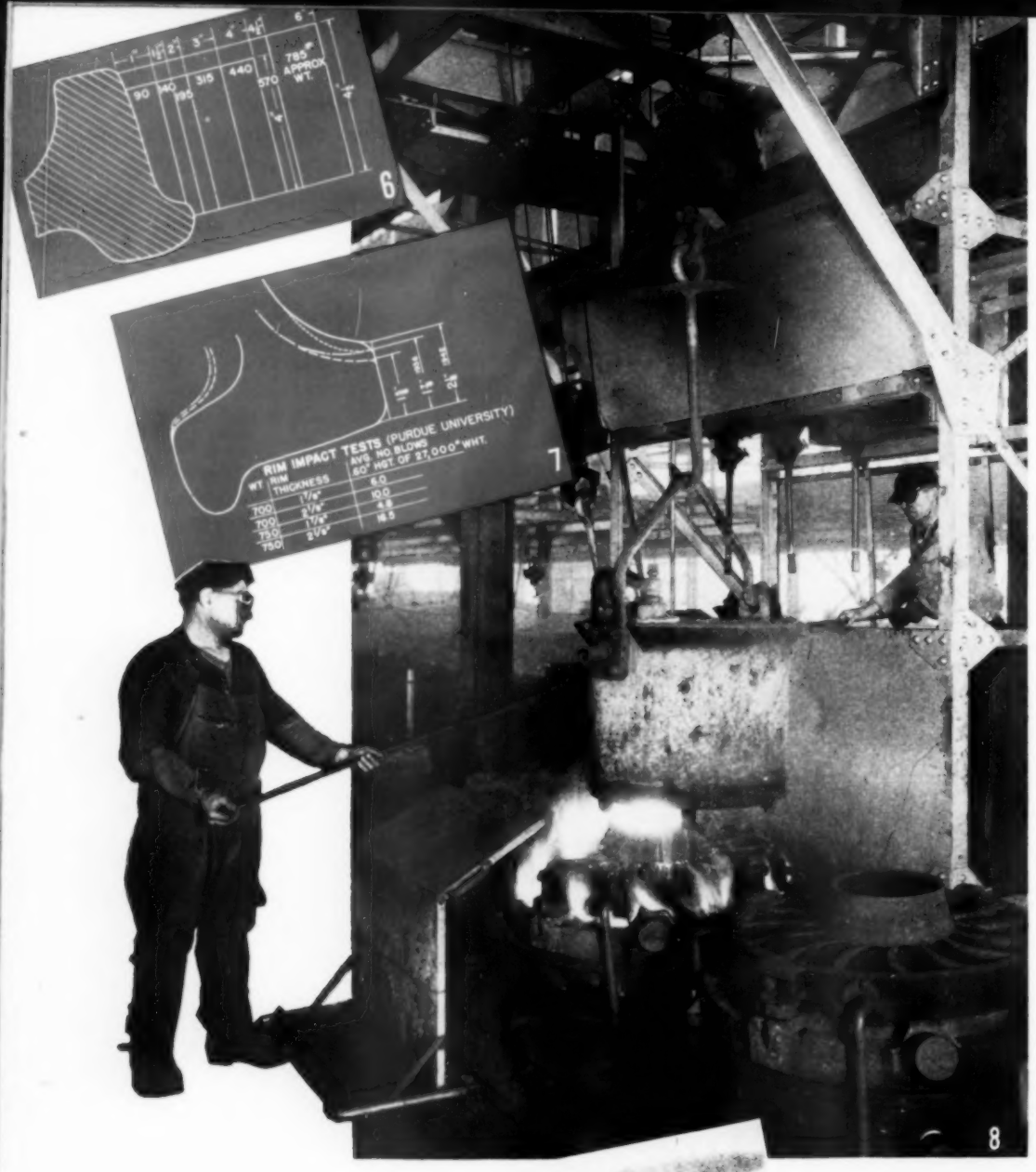


Fig. 6—Increasing thermal band thickness shows progressive severity of thermal test as manufacturing methods improved

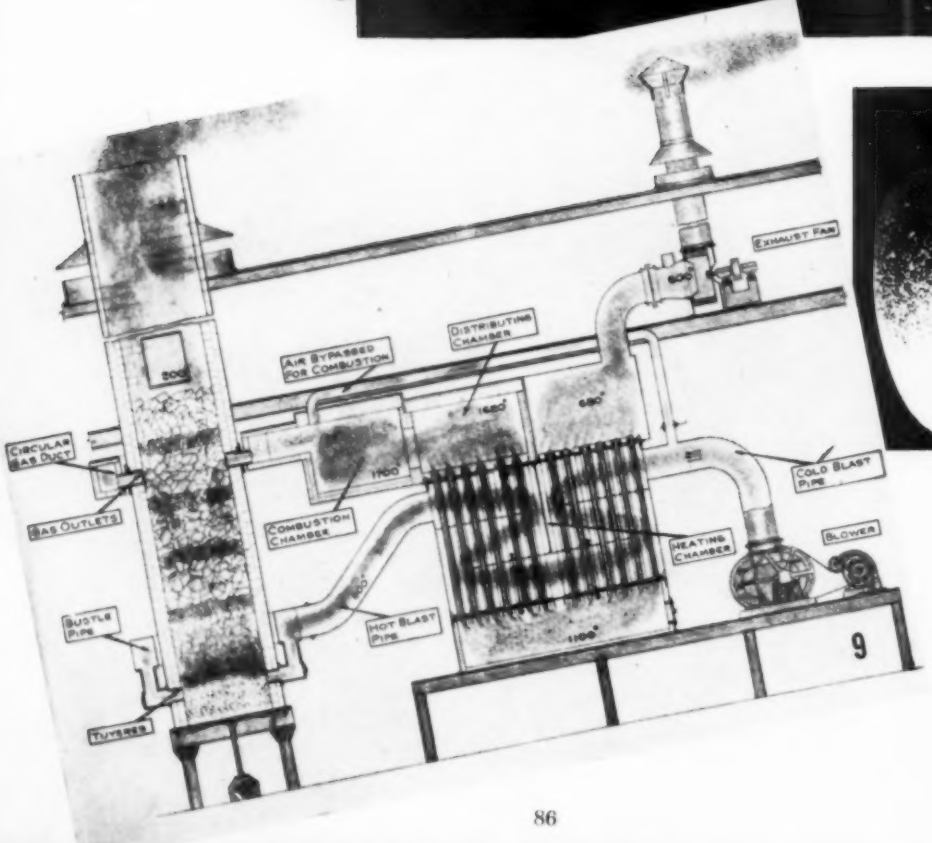
Fig. 7—Drawing shows dates rim thickness was increased and consequent increased strength for 700 and 750 lb wheels

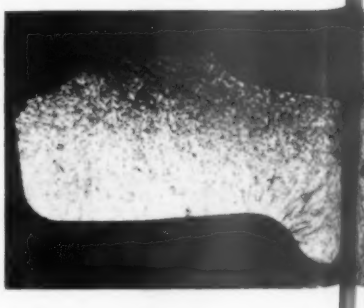
Fig. 8 — Wheels are poured from bottom-pour ladles in 8 to 12 seconds

Fig. 9—Griffin hot blast heater preheats air to 500 F for combustion, results in improved melting and chemical control

Fig. 10—Showing maximum chill on present wheels

Fig. 11 — Macrographs of past, present and future products. *A*—1939 tread section, with dispersed mottle and chill distribution. *B*—Dendritic pattern (1939). C—1942 tread section. Note improved demarcation between chill and gray iron, also proportion of gray iron to chill. *D*—Improved dendritic pattern (1942). *E* and *F*—Ultimate desired tread section





the vast research developments during recent years. Today, cast irons are produced with a wide range of metallurgical and physical properties and great care is exercised to see that the correct cast iron is made for each type casting.

The cast iron industry is one of the largest in the world. During 1945 shipments of gray iron castings exceeded 9 million tons. Of this total, shipments of chilled car wheels required nearly 900,000 tons, or 9.4 per cent of the total.

For over 100 years 80 per cent of the freight cars in the United States have been equipped with chilled car wheels. The average number of chilled wheels in freight service for the past ten years was 79.5 per cent of the total. This figure is significant in that it denotes that progressive improvements in the chilled car wheel have kept pace with modern improvements in quality and service. These improvements are becoming more evident with each annual analysis of Interstate Commerce Commission records.

Many Improvements Noted

The bracket-type car wheel, adapts itself to great flexibility towards metallurgical improvements. In recent years we have revised chemical composition of car wheel metal, adopted new methods of heat treating and annealing and adopted modern methods of melting, refining and inoculating the metal. We have eliminated the shipment of wheels with excessive chill. Our present design is a more perfectly balanced wheel, the plate having been moved to support the rim; more brackets support the flange, and the rim thickness has been increased. All these changes help to produce a wheel with less residual stress and better chilling properties.

Close control over manufacturing processes is maintained as a further step towards improving car wheels. Fig. 9 shows a hot blast heater developed by Griffin engineers. It preheats the air for combustion to 500 F and results in improved melting and chemical control and a superior metal. Besides these advantages, it reduces the coke required by 25 per cent, resulting in a saving of 14,000 tons of coke annually, or a net saving of $270,000. Waste gases are drawn from openings near the cupola charging door and are burned in a combustion chamber to produce a temperature of 1600 F. They are then drawn through cast iron tubes around which the cold air flows. The hot cupola gas is exhausted through a suction fan and preheated air flows into the cupola tuyeres.

Fig. 1 shows an air furnace-cupola combination known in the industry as the duplex process. This process produces a special low carbon, high grade cast iron with physical properties 25 per cent greater in every respect than normal cast iron. Improvements in flange and rim strength have followed through in a number of service tests on new cars. There are now about 70,000 wheels produced by that process in service on 50 and 70-ton cars and they have an excellent record.

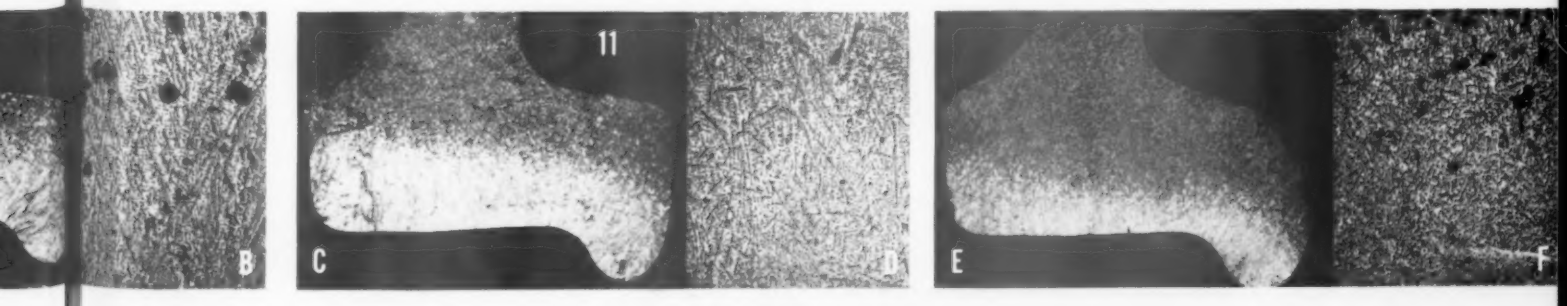
Pouring of the wheel is extremely important. It must be poured in 8 to 12 seconds to prevent manufacturing defects or imperfections. The special bottom-pouring feature of the ladle is conducive to smooth operation and good control of the metal stream. Fig. 8 shows a wheel being poured.

Iron or steel castings when cooling after they are poured, develop enormous casting strains. These strains, if not relieved, can increase in service and cause serious failures. To relieve this stress, wheels are heat treated in insulated annealing ovens shown in Fig. 4. The mechanical development of these annealing ovens and the metallurgical developments in our annealing practice or cycle, has relieved us of any possible concern over internal stress affecting the safety of our wheels.

The wheels are removed from the molds at a temperature above 1500 F and are immediately placed in the ovens. The ovens are sealed and cooled for 72 hours at 7 F per hour. This annealing cycle alters the structure of the material and through carefully developed routine metallurgical practices, the structure is controlled. No wheels are shipped unless they meet all metallurgical as well as physical requirements.

Results of the annealing process on the structure of the tread and plate materials is illustrated by the photomicrographs in Figs. 2 and 3. The process is simply a controlled reconversion of combined carbon. Before annealing, the plate material contains a coarse and dense pearlitic structure, indicating rigidity and confined stress. After annealing, the metal shows a modified pearlitic structure and the presence of free ferrite which denotes a flexible resilient material, relatively free from stress and strain. The same tendencies are evident in the tread materials. Before annealing, the structure is coarse and columnar; after annealing, the structure is finer but still retains its original hardness. The spheroidization of the pearlite denotes the degree of annealing and is used as a metallurgical guide.

Fig. 5 shows the thermal test being poured. This is the most important test required and is made especially severe to assure us that the material is thoroughly annealed and relatively free of internal stress when shipped. A 4½-in. band of molten iron is poured around the circumference of the wheel and the wheel must not crack or break. A surface check is allowed to compensate for superficial surface defects. To stand this test, the wheel metal must be melted correctly (*Please turn to page* 170)



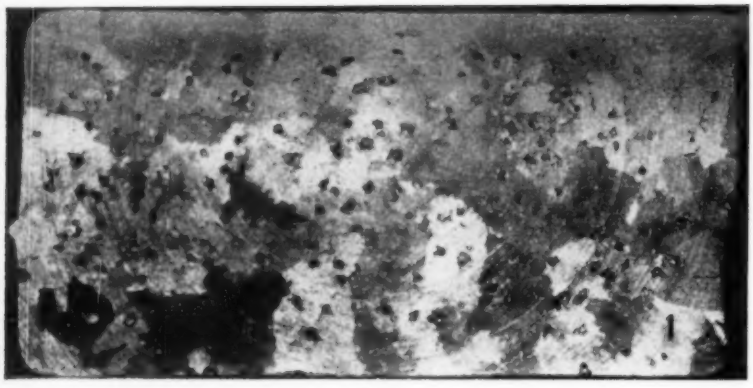


Fig. 1—Machined cross section of test casting showing pinhole porosity

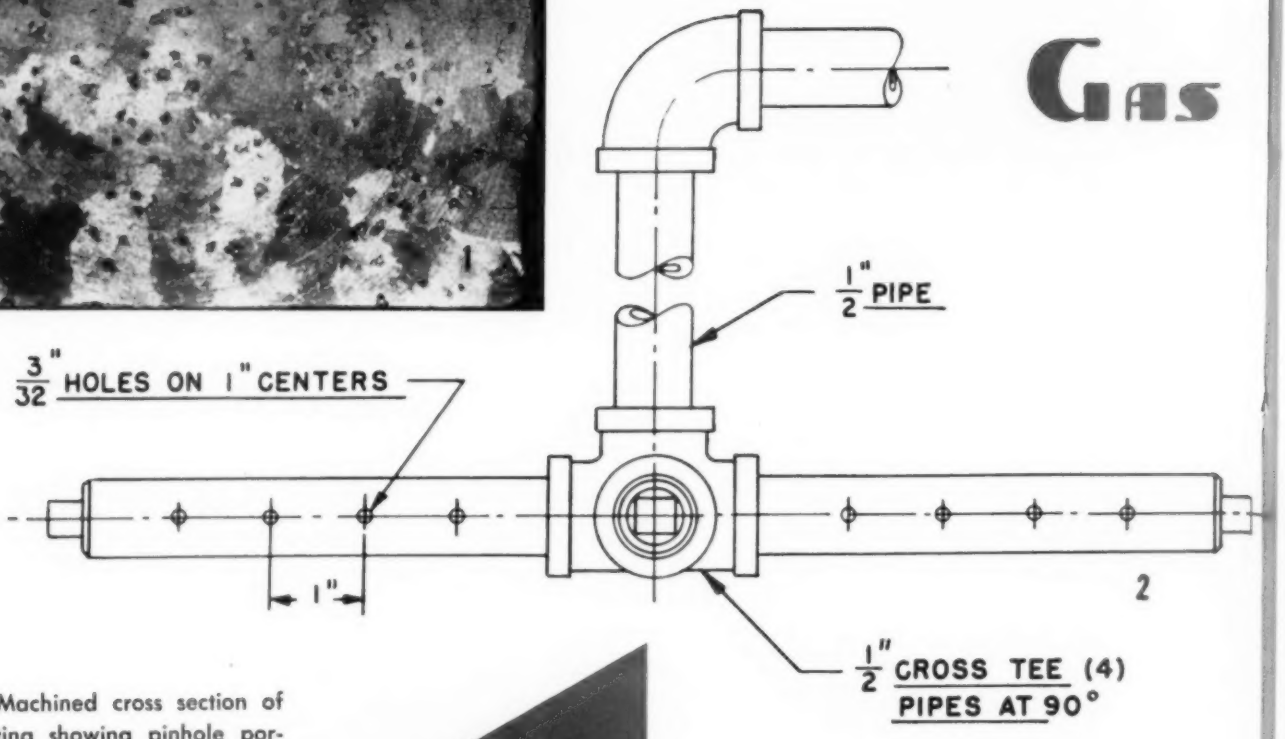


Fig. 2—Diagram of gas flux dispenser preferred by the author because the small perforations permit more uniform gas distribution. Dispenser should be made of carbon or graphite; metal is eaten away too rapidly by the molten aluminum

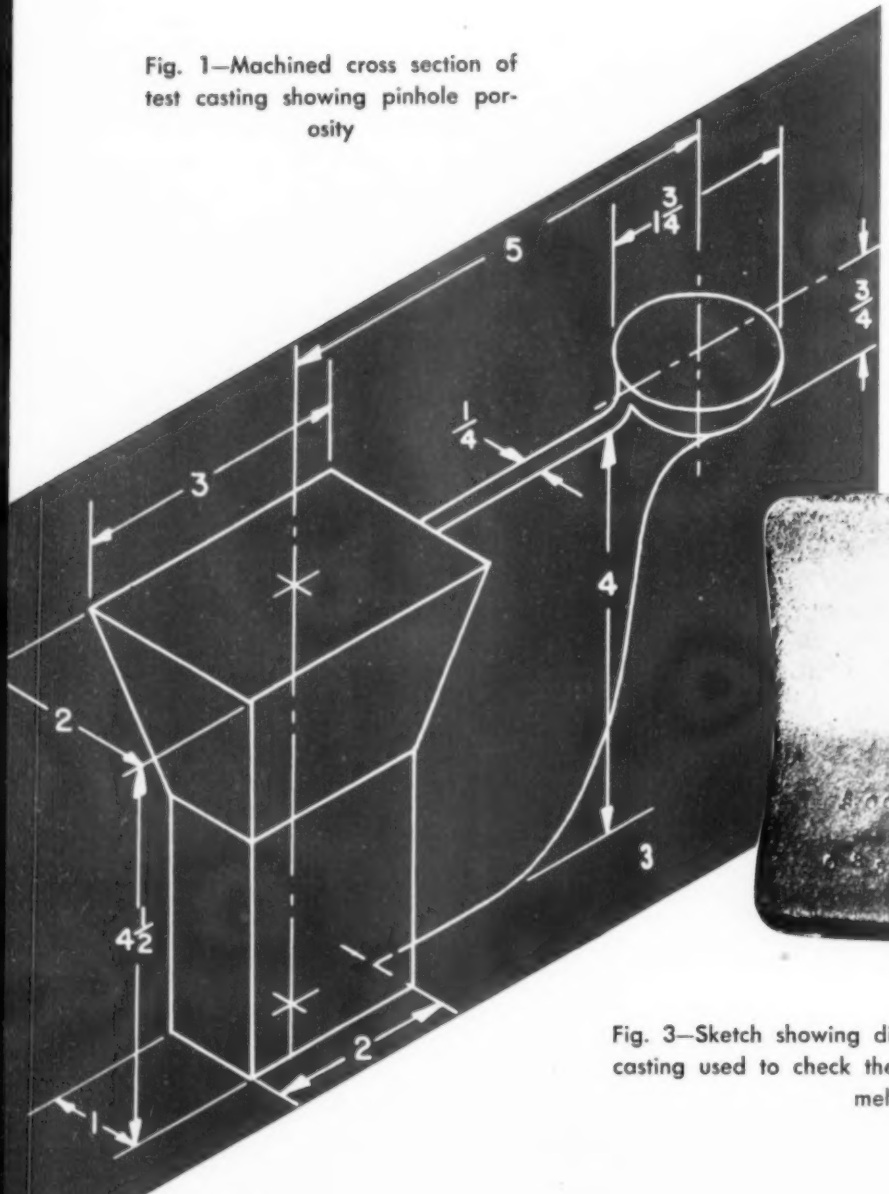


Fig. 3—Sketch showing dimensions of sample casting. Fig. 4—Sample casting used to check the effects of humidity and direct and indirect melting of aluminum alloys

Porosity in Aluminum Alloys

Causes of gas porosity in aluminum alloy castings and methods of avoiding it are discussed by the author. This paper was presented at the AFA Regional Foundry Conference held in Chicago, Nov. 21-22

By HIRAM BROWN
Chief Metallurgist
Solar Aircraft Co.
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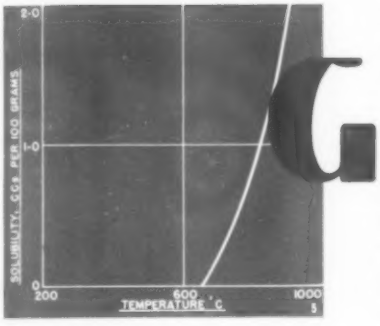


Fig. 5 — Curve showing rapid increase in gas solubility as temperature of metal increases above 1110 F

GAS POROSITY in aluminum alloys is generally encountered as pinhole porosity. Pinhole porosity results from the evolution of gas which was in solution in the melt. This porosity usually can be seen on the machined surface of the casting and will be found scattered throughout the entire casting but is most severe in heavier sections. Usually the holes are round, but contrary to general opinion, they can be very angular in shape. They can be shown by x-ray, too, where they appear as salt and pepper areas liberally sprinkled across the film.

Probably the best way to definitely identify pinhole porosity is that it is not continuous porosity but is a series of holes each surrounded by metal, so that actually no path of porosity is present to cause leakage such as is commonly encountered with channel or shrinkage porosity. It is not selective in its action; that is, it is found generally throughout the casting and not localized at definite areas. Fig. 1 shows the appearance of pinhole on a machined section.

Pinhole porosity affects castings in other ways than the poor appearance of machined sections. For example, with an aluminum-zinc-magnesium alloy (40E) severe pinhole porosity (deliberately produced) reduced yield strength 9.53 per cent, tensile strength 18.1 per cent, and elongation 16 per cent (see Table 1). Corrosion resistance and fatigue strength are seriously affected also.

The gas which results in pinhole porosity is chiefly, if not entirely, hydrogen. Hydrogen is practically insoluble in aluminum in the solid state or up to 1110 F. However, as the temperature of the metal increases above 1110 F the solubility of the gas increases rapidly, as shown by Fig. 5. Thus, when the metal is at usual melting and pouring temperatures (about 1400 F) it can dissolve an appreciable quantity of hydrogen. As the metal cools the gas solubility decreases and the hydrogen is forced out of solution and is trapped in the metal in the form of pinholes. If the metal is cooled rapidly, as in permanent molds, the metal freezes so quickly that the gas is either trapped in solution or remains minutely dispersed throughout the metal and is not visible to the eye. The slow cooling of metal in sand molds will be more conducive to the presence of pinhole porosity.

Hydrogen can find its way into aluminum in a number of ways. These possibilities will be discussed individually in following parargaphs.

Melting—Either oil or gas usually is used to melt aluminum. The products of combustion contain reducing gases which may be a source of hydrogen pickup. It is therefore, very bad practice to allow the products of combustion to come into contact with molten aluminum. Reverberatory type melting, where the flame plays over the metal, is not desirable for aluminum if the metal is being melted for casting. This is particularly true if oil is used as fuel. Experiments performed by the author show that, all other factors being equal, more pinhole is caused by direct contact of flames with metal when oil is used than when gas is used (*Please turn to page* 199)

TABLE I—Physical Test Results of Aluminum Alloy (40E) Showing Effect of Increasing Gas Porosity

Treatment	Psi Yield	Psi Tensile	% in 2" Elong.
Normal heating, poured at 1350 F	24,600	36,200	6.25
Heated to 1600 F, cooled to 1350 F to pour	23,500	32,000	5.25
Poled with green wood, poured at 1350 F	22,300	29,650	5.25

TABLE II—Determination of Actual Humidity from Wet and Dry Bulb Readings

Dry Bulb Deg. F	Wet Bulb Deg. F	Deg. F	Grains Moisture Per Cu Ft of Air
75	54	21	2.00
76	57	19	2.90
77	61	16	4.50
79	67	12	5.60

TABLE III—Effect of Actual Humidity on Size and Severity of Pinhole Porosity

Grains Moisture Per Cu Ft of Air	Type of Furnace	Number of Holes Per Sq In.	Size of Holes
2.00	Tilting	5	Very fine
2.90	Tilting	5–35	Very fine to medium
5.60	Tilting	100	Fine to medium
2.90	Barrel	75–105	Medium
4.50	Barrel	60–105	Medium to very large (3/64" diam)

The Public

Nearly 6000 people of Racine, Wis., took advantage of Belle City Malleable Iron Co.'s invitation to visit its plant Nov. 30. They learned not only how castings are made but also that a modern foundry is not the hot and dirty place it is commonly supposed to be

Fig. 1—Visitors finished their plant tour in the cafeteria where coffee and sandwiches were served during the day

Fig. 2—A display of malleable castings in front of this box car demonstrated the use of cast products in such equipment

Fig. 3—Wash and locker room in the new service building. Clothes hang in baskets

Visits a Foundry

DLAYING host to nearly 6000 people of the Racine, Wis., area on Nov. 30, the Belle City Malleable Iron Co. of that city and its Racine Steel Castings Co. division effectively demonstrated that the public is interested in seeing what goes on inside the industrial plant. It also proved that an open house such as this is an excellent method of giving the public an insight into the importance of castings, how they are made, the type of jobs available in foundries and the favorable working conditions prevailing in a modern foundry.

The Belle City foundries were operating during the open house so that all of the various processes could be observed. In addition, various exhibits were set up to explain some of the casting operations and applications, as shown in the accompanying illustrations. At the conclusion of the inspection tour the visitors were served refreshments in the company's attractive cafeteria.

Local newspaper accounts of the open house stressed the fact that the company has experienced good labor relations for approximately 25 years. *Racine Labor*, an AFL and CIO union newspaper, devoted a 4-page pictorial supplement to its Dec. 6 edition to the Belle City open house, and because its comments not only give a good description of the inspection visit, but also cite some of the things that make for the good relations between employees and management, they are reproduced here in part:

"It was a swell stunt, this idea of inviting the city over to see how things are done in one of the most modern and highly mechanized foundries in the Middle West. From the fine air-conditioned office to the 350-foot annealing furnace, one of the few of its kind, families of the Belle City employes and interested visitors tramped through the sprawling buildings on Forest St. to observe the conditions under which some 900 of our citizens work.

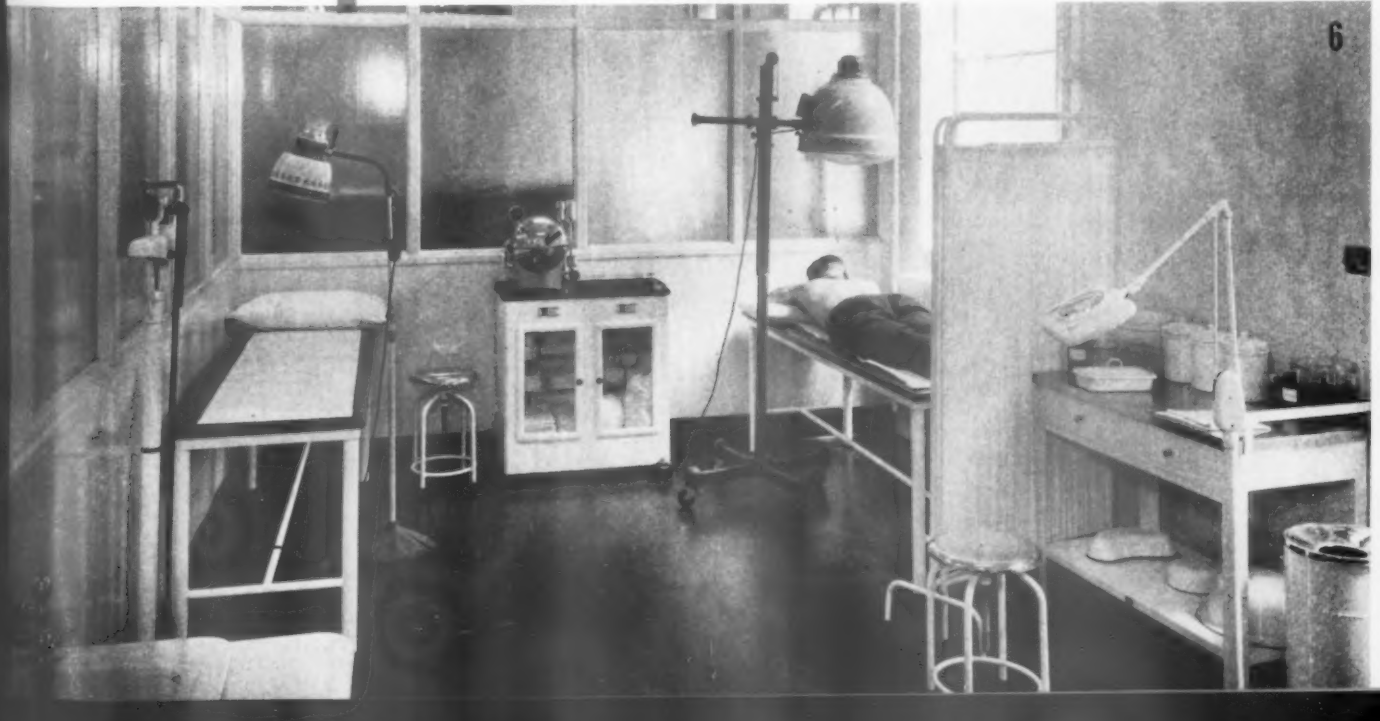
"It was not the hot, dusty, smoke-filled hell-hole that foundries are usually pictured. Of course, there were jobs where the heat was pretty terrific, and there was some dust and smoke, but the cleanliness of the place was amazing, even assuming that the company 'spruced up' a bit for the occasion.

"There was nothing particular about the affair, no great event to celebrate. It was just one neighbor inviting others over to see the progress that has been made. That progress at Belle City and its sister firm, the Racine Steel Castings Co., includes a new air-conditioned service building housing the plant hospital, the carpenter shop, pattern shop, engineering department, employment department and a large cafeteria

Fig. 4—Tunnel connecting the foundries with the new service building

Fig. 5—Service building cafeteria

Fig. 6—Lamp room of the plant hospital, also located in the new service building



where employees can get warm meals at cost.

"It includes new restful green wall coloring, a photomicrograph department which makes it possible to study the internal structure of metals, a high-power x-ray machine with which it is possible to determine whether a casting is sound all the way through without cutting it up to see.

"Belle City manufactures castings for railroads, agricultural, road building, automotive and industrial equipment. Its product is basic to the machine age—and, unlike many plants where the human element is given little or no consideration in the machine age process, here it is considered a vital link.

"The new washroom, for example, has the air changed seven times per hour. Sweaty clothes are dried in baskets which are hoisted to the ceiling instead of being stored in lockers. This way they are aired and dried thoroughly before being used again.

"Mechanized operations in the foundry to make the work lighter, easier and agreeable were on parade Saturday. Conveyor lines form an integral part of the setup. Hopper lines carry sand right to the molder's bench. A 'slinger line' handles larger molds, assembling upper and lower halves of the molds, (*Please turn to page* 137)

Fig. 7—This exhibit showed the variety of tools used in making wood and metal patterns

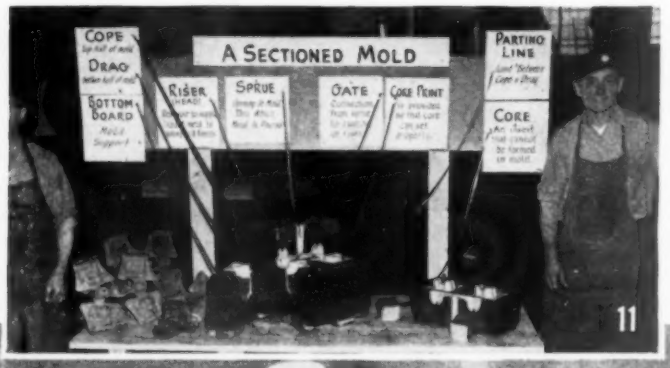
Fig. 8—Interested groups watched the pouring of molds on a conveyor line

Fig. 9—Molding line with sand delivered to overhead hoppers

Fig. 10—Sandslinger ramming molds as flasks revolve on turntable

Fig. 11—This sectioned mold graphically explained how metal is cast

Fig. 12—Rest room in new service building for women employees



GOOD HOUSEKEEPING and Plant Maintenance

How to put in practice a program that will keep the foundry clean, orderly and well maintained is discussed by the author. This paper was presented before the AFA Regional Foundry Conference held recently in Chicago

By JAMES THOMSON
Chief Works Engineer
Continental Foundry & Machine Co.
East Chicago, Ind.

THE foundry industry has a future before it which will be even greater than its accomplishments in the past. In discussing the future in a recent article, Charles F. Kettering made the following pertinent statement:

"I want the future to be better than the past. I don't want it contaminated by the mistakes and errors with which history is filled. We should all be concerned about the future because that is where we will spend the remainder of our lives. The past is gone and static. Nothing we do can change it. The future is before us and dynamic. Everything we do will affect it. Each day brings with it new frontiers, in our homes and in our businesses, if we will only recognize them. We are just at the beginning of progress in every field of human endeavor."

For many years the foundry industry grew from small beginnings, and much of the work was done by "rule of thumb," but the last three or four decades have seen a remarkable trend toward the scientific approach to our problems. In such societies as the American Foundrymen's Association we have been getting together for discussion and dissemination of ideas and information. Much research work has been carried on by many companies through their engineering, metallurgical and chemical staffs. Developments and improvements in foundry equipment have been marked. The foundry of today is a far different place than the foundry of 30 or 40 years ago.

However, we have many unsolved or only partially solved problems for the future. These problems offer a challenge to young men to enter our industry and help in their solution. Young men educated in science and engineering can find in our industry fertile fields for the practical application of their education and plenty of opportunities for research work. The industry should do a better job of having these facts brought to the attention of college students in the future than it has done in the past.

We have been blamed, and not without some reason, for having plants that are dirty and unpleasant places in which to work. Some such plants still exist, but great strides have been made the last decade by many foundry organizations in good housekeeping, and this charge can no longer be thrown generally.

Note the improvement in buildings, with lots of daylight and ventilation, reduction of dust hazard, good artificial lighting, safety appliances, excellent washroom and restroom facilities and the installation of labor-saving machinery, to mention only a few of the many features.

Today, in many foundries a workman, if he is so minded, can go to work in good clothes, change to his working clothes in the locker room and before he goes home take a shower and change back to his good clothes so that the lady sitting next to him in the streetcar need not turn up her nose at the "dirty foundryman"; in fact, she cannot tell whether he works in a bank, a store or at some other clean occupation. This is an index of the trend in many individual foundries; the hope is that it will extend to every single unit in our industry.

I have often wondered whether the adoption of the words "Good - Housekeeping" was a mere happenstance by those who first applied it to our industry, or whether the meaning of the words was really investigated and adopted after due consideration and study.

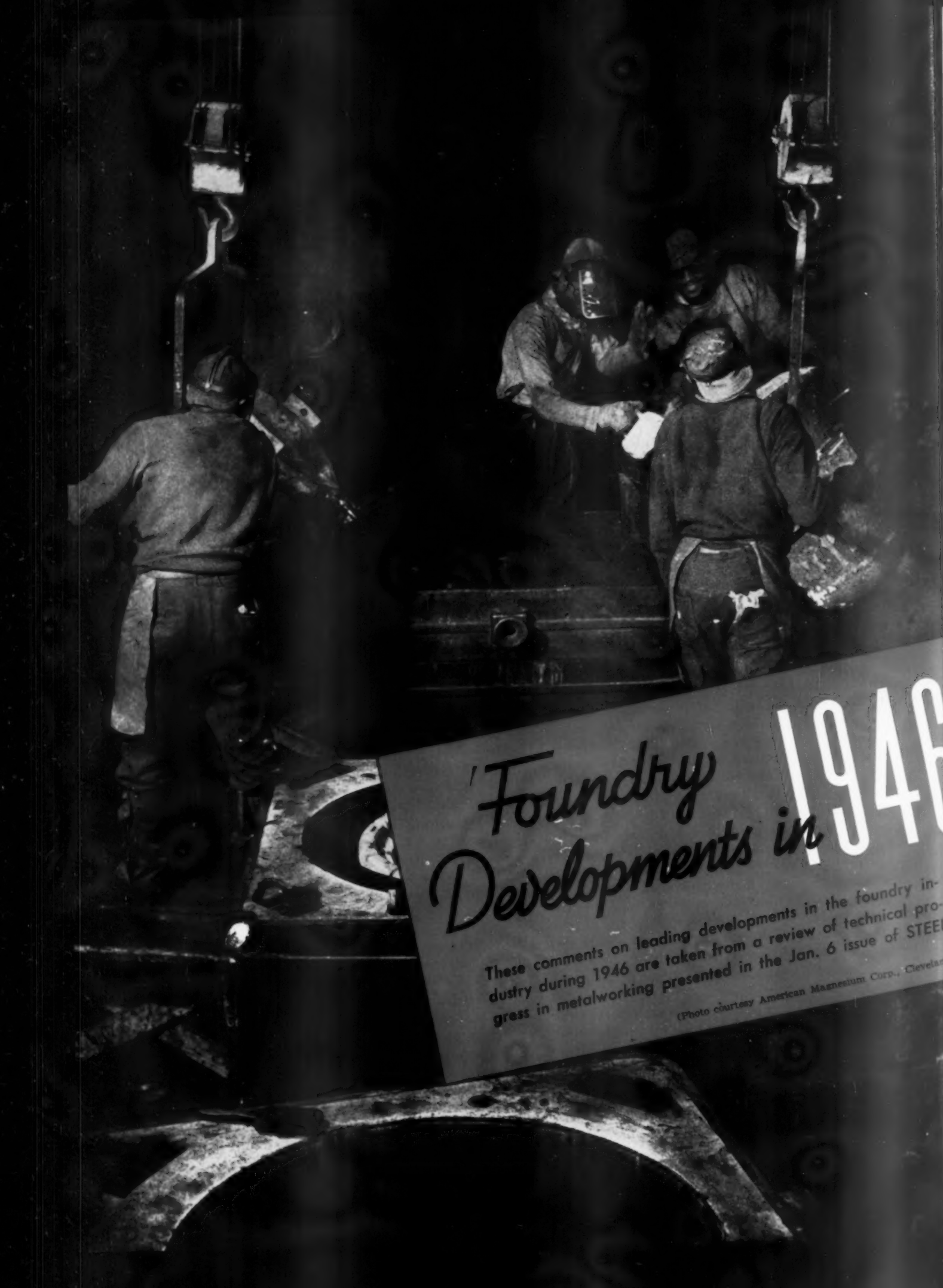
Did they want to have us look at our plants somewhat in the light of a well kept house? Or were they trying to make them as home-like as possible? In any case I think it was a happy comparison.

I took the time to look up the subject of housekeeping in the *Encyclopedia-Britannica* and discovered some interesting facts. For instance: "Success in this work is important for all the family members and for the community as a whole" and again, "The quality of the nation's housekeeping has great influence on the health, the morale and the general standard of living of all its people."

Management—The program and standards for housekeeping in an industrial plant must be set up by the management. Generally speaking, the housekeeping likely will not be any better than the demands of management; just as in a home the character of the housekeeping is determined by the housekeeper.

Management has more to do than just express a desire for good housekeeping. It must be ready to spend money for equipment and changes needed to accomplish the desired results. The old proverb of "A place for everything and everything in its place" is meaningless unless we provide the "place," and only management can do this.

It is a pleasure to visit a foundry where the management has established an orderly floor plan, with safe walkways; buildings with good ventilation and light; bins, shelving, hooks, etc. for storing portable equipment when not in use and where the workmen have been educated to use these facilities instead of throwing things on the floor to be stepped over or perhaps for someone to trip over and be injured. Not only is this a better looking shop but it can be kept clean (*Please turn to page* 239)



Foundry Developments in 1946

These comments on leading developments in the foundry industry during 1946 are taken from a review of technical progress in metalworking presented in the Jan. 6 issue of STEEL

(Photo courtesy American Magnesium Corp., Cleveland)

Shortages Impede Gray Iron Industry

By DONALD J. REESE
International Nickel Co. Inc., New York

THE composite performance of the gray iron castings industry during 1946 was poorer than the subnormal war years. Raw material, governmental controls and labor problems were the major retarding influences. The composite industry did not improve its metallurgical or inspection standards.

Equipment builders, engineering and consulting firms to the foundry industry have been swamped with orders intended to modernize the industry's processing and production methods. The "sealed beam" automobile lamp was adapted to the tough problems of adequate lighting in the foundry, this year, and appears to put sufficient candlepower at the working level.

Improved foundry techniques to achieve a high order of dimensional precision and the desire to do a better job at the foundry level in co-ordinating the foundry manufacturing process, the engineering material and end use performance of component parts were noticeable trends in specific foundries. In the wide variety of types of cast iron produced by this industry, the martensitic white irons made the most progress.

Scrap Contamination a Problem

By W. H. WHITE
Jackson Iron & Steel Co., Jackson, O.

DEMAND for castings remains high and there is no immediate sign of a lessening of that demand. In the mad scramble of the war years, ferrous scrap was badly mixed and contaminated with every conceivable alloy. Many foundrymen give "lousy scrap" as their number one concern.

As time goes on, much of this inferior material will be digested or removed from circulation by one means or another, only to recur at a later date to a lesser degree. There is no way of eliminating it altogether.

Foundrymen require raw materials as clean as possible to minimize this contamination. The blast furnace is the only source of such material, and phrases such as "a blast furnace product" and "smelted from virgin ores" have a new meaning to foundrymen. It is a safe prediction that their need will cause a high demand for pig iron for some time to come.

Malleable Plants More Efficient

By JAMES H. LANSING
Malleable Founders' Society, Cleveland

IN THE malleable iron casting field, progress during 1946 was in improving operating efficiency and working conditions while maintaining quality standards.

Attention has been focused in many cases on the annealing departments where a plant's entire production must be handled twice, that is, going into and coming out of the anneal. In addition, containers and packing materials, if employed, add to the handling requirement. Various types of mechanical handling equipment have been installed and, in every case, accompanying steps have been taken to improve working conditions through dust elimination and reduction in the weight of any loads to be individually handled. Metal, fuel and sand handling equipment also has been expanded in the industry.

Experimental work in the development of a type of test bar which more accurately reflects the properties of malleable iron castings has also been in progress. Control of melting and annealing equipment has aided in excellent control of the product. In the annealing equipment field, an oven employing fans to circulate the oven atmosphere, and cooling coils to effect a quick drop to the second stage annealing temperature, has been effective and economical and will doubtless have increased future use.

Research Aids Steel Castings

By CHARLES W. BRIGGS
Steel Founders' Society of America, Cleveland

THE overall position of the Steel Casting industry on technical control and development is excellent. The very favorable position created by the industry during the war years through a step by step building of quality controls has not diminished during this first year of peace production. In fact, the release of pressure resulting from quantity demands has resulted in more attention to casting quality and technical developments.

The universal use of necked-down feed risers was of considerable assistance in speeding up steel casting production by reducing the number of operations in the cleaning department and in decreasing costs. The use of necked-down risers has been extended to side-feeding risers, blind risers and to risers that are attached to castings of various shaped contours. Also during the year extensive work has indicated that refractory cores for necked-down risers give good service and standard shapes are advantageous in many applications. Studies indicate and experience has proved that the necked-down risers can be used on casting sections which require feed risers upward of 36 in. in diameter.

Experiments on the pressure feeding of steel castings with pressures greater than atmospheric were reported on during the year, and this method of feeding is being investigated by a number of steel foundries.

Precision casting of steel is continuing its forward movement. Most of the steels cast by the investment molding process have been of the corrosion and heat resistant type; however, in the last year experience has been gained in the casting of the low alloy steels.

Production problems involving operational costs, metal feed demands, sands, and evaluation of supplies are being investigated. Cast steel properties have been continued during the year to increase the knowledge of the purchaser as well as the foundryman as to the wide field of application of steel castings.

Considerable information has been developed during the year on the hardenability of cast steels and the method of producing steel castings to hardenability specifications. The Society of Automotive Engineers adopted during the year a new specification on steel castings for automotive use, and one portion of this specification requires the supplying of alloy steel castings to hardenability values. A symposium on the production of steel castings to hardenability specifications was presented by five authorities of the steel casting industry before a Technical and Operating Conference of the Steel (*Please turn to page* 235)

Questions and Answers

Eliminating Casting Warpage

Q.—We are experiencing some difficulty with our gray iron castings in that they warp or twist after machining so that tolerances on the latter cannot be held. Parts on which the trouble is most noticeable are engine frames, cylinders, crossheads, flywheels, etc. We are considering the installation of stress annealing to correct that difficulty, but since it is rather expensive we wonder if there may be some other approach toward eliminating our trouble.

A.—Two possibilities exist by which you might be able to alleviate trouble from twisting and warping during machining operations. One is a change in design of the castings themselves or in the gating methods, and the other is natural aging whereby the castings are stored for weeks or months before machining or after taking the first rough cut. The first involves considerable time and expense, and may not result in the desired improvement of all conditions, and the other means that a considerable bank of parts will have to be on hand to permit storing for the desired length of time.

Stress relieving operations to promote stability in dimensions are conducted at temperatures from 800 to 1000 F which result in slight if any, change of physical properties of the castings. The most suitable temperature will have to be determined by experiment, and will depend on the critical transformation range of the iron. Castings usually are held at temperature for one hour per inch of the heaviest section, and must be cooled in the furnace.

Pinholes Appear on Cope Face

Q.—What causes pin holes and porosity on the polished surface of aluminum castings? How can this form of defect be prevented? Is aluminum scrap from an aircraft engine plant suitable for making tablets and markers?

A.—Several factors may be responsible for pin holes and porosity in aluminum castings. The two main items either singly or in combination are sand that is too damp, or metal that is not melted or handled properly. The subject has been covered extensively in THE FOUNDRY in recent years. Using miscellaneous scrap from an aircraft engine plant carries the same hazard presented in the use of miscellaneous scrap from any source. The principal objection in this instance is that some or all the scrap contains more or less magnesium. This will cause trouble unless the melting and molding practice is suitably adjusted. Under ordinary conditions the small holes in the cope face of the castings are formed by gas or air bubbles trapped in the metal at some stage between the melting furnace and the mold. In a thicker casting poured from a comparatively high head these bubbles would have a chance to escape before the metal solidified.

In the present instance the thin film which always covers molten aluminum became so dense when it touched the cope that the bubbles remained in captivity. Assuming that the sand is satisfactory one naturally examines two other factors—transfer of metal from furnace to pouring ladle, and method of pouring metal into the mold. At some stage in the transfer a certain amount of air is caught and held in the stream, to appear later as small cavities in the cope face of the casting. To avoid this the metal stream should be fair and steady. At the mold the sprue should be filled and kept filled with the ladle lip close to the sprue opening. Rough handling of skimmer or pyrometer may introduce air bubbles in the metal. Although temperature is not a very important factor in the present instance, 1300 F. should be high enough for pouring the castings.

Castings Leak Under Pressure

Q.—We are having trouble in making a flanged cap or dome casting about 5 in. diameter and 5 in. high with a side outlet near the flange, and a boss at the top. Casting is made on the side and poured through a single sprue leading to a branched runner cut into the flange and to the boss. A riser 1 x 1½ in. and 2 in. high is located over the section which in use forms the top of the dome. Metal thickness of the side is 7/16-in. and the top 3/8-in. Alloy used is 85-5-5-5 poured at approximately 2100 F. We also have used 80-10-10. The trouble is that many of the castings leak when tested hydraulically in the section which comprises the top of the dome. Sometimes leaks show at other points. We would like to have information on how to eliminate the trouble, and also would like to know how much pressure a casting of this type will withstand before leaking.

A.—Without a defective section of the casting to examine, we are at loss to decide whether the cause of the trouble is gassed metal or lack of feed. However, you can determine that for yourself by fracturing a number of castings across the leaky section and examine the structure preferably with a low power magnifying glass or with the naked eye. If the fracture shows small pinholes just under the skin, the cause of the leakage is gassed metal. If the structure shows a dendritic or feathery pine tree-like appearance with interconnected minute passages, the trouble occurs from lack of feed.

However, it would be our guess that your trouble arises mainly from gassy metal since if it were caused by insufficient feeding, the majority of the castings would show leakage. Therefore, we suggest careful attention to melting to see that the metal is melted rapidly under slightly oxidizing conditions, and that when it comes to temperature the metal is not allowed to stew in the furnace, but rather is removed and poured into the molds.

As far as your method of gating is concerned, we believe that the riser you are using is of little value for feeding purposes. You would be better off to place it as close as possible to the boss on the runner, and gate

from that into the latter, placing a thin cut-off core with a small hole in it between the two.

Your question on the resistance to hydraulic pressure is not quite clear. If you refer to designing a part to meet a specific requirement on pressure, a factor of safety usually is specified which varies with the service conditions, and may be from 3 to 10 or higher. The tensile strength divided by the factor of safety gives the allowable working unit stress. Using the formula for determining the stress in the wall of a thin tube $S = pd/2t$, and a factor of safety of 5, which would be conservative, the casting should withstand a pressure of around 950 psi using the thinnest section of 3/8-in. However, to do that the casting must be sound. If it is not, it may leak at only a few pounds pressure.

¡Patterns Are Not Ready Made

Q.—Please advise us where we can buy stock patterns for ornamental novelty items for cast iron, aluminum or brass production.

A.—So far as we know there is no place where you can "buy stock patterns for ornamental novelty items for cast iron, aluminum or brass production." Patterns are made to order. They are not made and stocked. You can place an order with a pattern shop to make your patterns, or possibly you may be able to get a set of patterns from a novelty manufacturing firm, going out, or gone out of business.

Slush Casting Aluminum Alloy

Q.—We will appreciate any information, articles and books on slush molding practices for aluminum and magnesium-base alloys. More specifically we would like to know if slush molding is used much, and is it successful with aluminum and magnesium? What minimum diameter of section will allow the voiding of a casting interior in the slush molding process? By that we mean what is the minimum cross sectional area from which still molten metal may be poured before the entire mass becomes solid.

A.—We understand that one foundry producing lighting fixtures tried out the slush casting method for production of aluminum alloy lamp pedestals or standards, but do not know whether it was applied on a large scale. However, we do not believe that the practice could be applied to magnesium base alloys due to the necessity of a protection from the atmosphere and to its low thermal capacity resulting in rapid freezing.

As far as literature on the subject of slush molding is concerned, not a great deal is available, and does not supply much information on details. However, one by R. J. Anderson which was published in the Jan. 1, 1932, issue of *The Metal Industry* (British) on "Slush Casting of Aluminum Utensil Spouts" discusses in considerable detail the use of the process in production of teakettle spouts.

He states that factors affecting the wall thickness of those castings include the temperature of pouring, temperature of the mold, speed of pouring, period of time between filling and slushing, and speed of slushing. While no mention is made of the smallest diameter which can be slush-cast, it can be pointed out that the tapered spouts range from about 1½ in. at the largest diameter to ⅝-in. at the smallest. Determination of minimum diameter probably will have to be made through experimental work by co-ordinating mold thickness in addition to the other factors mentioned previously.

Cast Iron Roll Shows Streak

Q.—Our printing press rolls are made in dry sand molds with a riser at each end and horn gates on the bottom. These castings are machined, ground and polished. The least form of defect, even microscopic cracks invisible to the naked eye, will cause rejection. Formerly with special pig iron and high grade iron and steel scrap the castings were perfect. Recently while forced to use any available raw material, approximately one of every six castings shows a dark streak on each side about 4 inches below the parting line. The streak varies in length from 12 in. to 4 ft, the full length of the roll. We shall appreciate your opinion on the cause and prevention of this form of defect.

A.—Dark streaks or areas on the machined surface, particularly of large gray iron castings, are not uncommon. In the great majority of instances they are ignored, since they do not affect the utility of the casting. They are caused by minor variation in the graphite formation in the adjoining areas and in the main body of the casting. This variation in carbon form and distribution is almost inevitable where unsuitable material is melted in the cupola, and doctored either in the cupola, or by the addition of other material in the spout or in the ladle.

Under proper conditions and with metal melted and maintained at maximum temperature, this form of manipulation is performed successfully. As the temperature of the metal decreases, the tendency toward forming a uniform, completely diffused and homogeneous liquid metal is lowered. This is one of the main arguments in favor of using

GANGWAY! By J. A. PATTERSON

"Gluckerson, you been writin' to the Lonely Hearts Club again?"

a forehearth or a reservoir ladle in front of the cupola. In the present instance the suggested course of procedure is to melt the iron as hot as possible, allow it to stand in the ladle for a reasonable period, stir vigorously with a long bar to hasten the thorough and uniform mixture of all ingredients, and then pour the metal rapidly into the mold. The metal in the mold should be kept moving rapidly. A temporary lag at any point has a mild chilling effect with resulting effect on the carbon content in the immediate vicinity.

Bronze Casting Contains Iron

Q.—We are sending for your examination a bronze pump impeller, and would like to have an analysis of the metal; more particularly of the white or light colored spots which appear on the machined surface. How can they be eliminated and what caused their appearance?

A.—Since we are not equipped to perform analytical services, we cannot provide the information requested on composition of the bronze. However, we can tell you from visual observation based on experience that the light or bright spots on the surfaces are iron. In some cases the iron has become more liquid during melting than in others, and its appearance or mode of arrangement accordingly is somewhat different. The iron in some places has fused quite well into the structure of the bronze impeller while in others it remains as well defined globules.

While we do not know definitely where the iron came from, we suspect that it originated in use of borings or turnings from the machine shop. Such material should be subjected to magnetic separation to free it from the iron or steel. Possibly it may have come from scrap brass or bronze containing iron or steel parts which were not removed prior to melting. If neither of those materials was used in the heat, then we suggest that you call in your ingot supplier, and ask for an explanation.

Suggest Aluminum Core Driers

Q.—In the manufacture of pipe fittings we use a great many small cores of which the more fragile are baked in cast iron driers. We are considering the practicability of making the driers of some lighter weight material to reduce the loads to be handled and also perhaps the amount of heat required. We presume that aluminum or one of the related alloys might meet our requirements, but we do not know which metal to choose. Also we desire information as to whether those castings can be pressure cast to finish size or whether they should be sand cast and machined to size.

A.—For the purpose you have in mind of reducing weight in handling of core driers, we believe that one of the aluminum alloys should serve the purpose admirably—and since aluminum is a good heat conductor, it is possible that the heat load also might be reduced. Perhaps the 10 per cent Cu, 1.2 per cent Fe, 0.2 per cent Mg-aluminum alloys used for auto pistons and air-cooled cylinder heads which must be stable at elevated temperatures might serve better than some of the others. However, you could have several driers made in each of several aluminum alloys—run them through the regular drying cycle for a month or so, and then pick the one giving the most satisfactory service. We believe that before placing the driers in service they should be run empty through the cycle a couple of times, and checked for possible warpage.

As far as the method of producing the driers is concerned, we believe that will depend on the accuracy desired. Ordinarily core driers are not made to close tolerances, and the ideal drier would be one which is open for the admission of the heated air except at a few points required for support. In that we have in mind the use of linseed-base core binders in which the oxygen of the air polymerizes the oil and develops its adhesive power. However, in the case of small cores such an arrangement of the drier probably would hardly be worth the time and effort for designing and constructing the pattern since we believe that it can be cast closely enough in contour to hold the core to the desired shape.

On the subject of core driers for small and medium cores your attention is directed to the possibility of constructing them with short legs so that they may be set one on top of the other, and with such an arrangement you can see that your core oven capacity could be increased in proportion to the head room available. The legs need be only a couple of inches high—just sufficient to clear the top of the core in the drier below—and to allow a free circulation of oven atmosphere. To facilitate handling the stacked drier without slippage, either raised or depressed corner locating points should be made on the top surfaces of the driers.

Resisting Acids and Akalies

Q.—Can you give us some information and data concerning the preparation of cast irons and steels resistant to acids and alkalies and more particularly to concentrated sulphuric acid at 200 C and to caustic soda at 350 C? This is in connection with processes recently developed and which are not covered by patent.

A.—Temperatures involved in your inquiry on cast irons and steels to resist sulphuric acid and caustic soda are unusually high. In the case of sulphuric acid, assuming you mean 66° Be, we would prefer straight carbon steel to any cast iron—high alloy or otherwise. Low alloy steel is likely to be no more resistant than plain carbon steel. Satisfactory service will be attained *if* water and moisture are kept away from the acid. Dilution of the acid promotes rapid attack on this material. We believe that the 18-8-Mo (18-22 Cr, 7-9 Ni, 2.5-4.0 Mo) type steel would afford a considerable safety factor against occasional minor dilution. If dilution is likely to be frequent, some of the special high chromium alloys may be required. Avoid high silicon (14.5 per cent) iron.

For caustic soda at 350 C pure nickel castings are recommended if the caustic is strong, say about 50 per cent concentration. Regular steels and cast irons are attacked—at times somewhat severely. In any case they discolor the caustic. The temperature 350 C is above the range of proper usage for most cast irons. Austenitic cast irons are resistant to caustic and the temperature. However, we would be afraid of stresses resulting from thermal gradients as well as those mechanically induced. (See "Stress Corrosion of Austenitic Cast Irons," by Urban, Bolton and Smith, THE FOUNDRY, November, 1946). Monel metal and 18 Cr-8 Ni also probably would be satisfactory.

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2. Heat Treatment Fundamentals
3. Recommended Methods of Adding Nickel with other Alloys to Cast Iron
4. Use of Insulating Pads and Riser Sleeves for Producing Sound Bronze Castings
5. Sixty Thousand Pound per Square Inch Cupola Iron
6. Guide to the Selection of Engineering Specifications for Gray Cast Iron
7. Foundry Practice for Nickel Silver
8. Production and Properties of Age Hardenable 5% Nickel Bronze Castings

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THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

MEN of Industry

JAMES W. WOLFE has been appointed executive secretary of the Non-Ferrous Founders' Society, succeeding Arthur E. Pye. Mr. Wolfe has had long experience in the foundry industry in both production and cost work. For approximately the past two years he has been associated with the Non-Ferrous Founders' Society as field representative.

♦ ♦ ♦

H. Oliver Pels, until recently general foreman, Central Foundry Division, General Motors Corp., Lockport, N. Y., has been appointed night superintendent. Mr. Pels joined Harrison Radiator Division of General Motors, Lockport, in 1935, where he worked in various departments. In 1940 he was appointed foreman in charge of the gray iron, bronze and aluminum molding and melting departments and was transferred to Central Foundry Division the following year.

♦ ♦ ♦

A. C. Meyers has been appointed manager of the nickel department, Williams & Co. Inc., Pittsburgh, with warehouses located in Pittsburgh, Cleveland and Cincinnati, from which points nickel is distributed for the International Nickel Co. Inc., New York. For the last 20 years Mr. Meyers has been actively engaged in development work involving the use of nickel in castings, particularly in cast iron. He has been a member of the Pittsburgh Foundrymen's Association, American Foundrymen's Association, and the American Society for Metals, for many years.

♦ ♦ ♦

Walter Horth, foundry plant engineer, Cincinnati Milling Machine Co., Cincinnati, has been appointed mechanical engineer, National Engineering Co., Chicago. Mr. Horth was graduated from University of Berlin in 1928 and was employed in Germany as a designer of special machinery until he came to this country in 1930 as an exchange student. He became associated with Alvey-Ferguson Co., Cincinnati, as a machinery designer and erector, later becoming production manager and chief draftsman. In 1939 he joined Cincinnati Milling Machine Co. when its new foundry was being built. He has contributed extensively to practical improvements in foundry production and equipment.

♦ ♦ ♦

Ray E. Valentine has been appointed assistant district sales manager in the St. Louis railway sales office, National Malleable & Steel Castings Co., Cleveland. Mr. Valentine joined the company in 1913 and has served in the traffic department, Cleveland sales division, Chicago plant, and St. Louis offices. During the recent war he served as chief of the Malleable Iron Section, Forgings and Castings Branch, War Production Board, from 1943 to 1945, when he returned to the company as St. Louis railway sales agent. **John R. Kingman,** who joined the company's engineering department in Cleveland a year ago and was transferred to the St. Louis office as field engineer, succeeds Mr. Valentine as sales agent there. Mr. Kingman, a graduate of Columbia University, took postgraduate work at University of Chicago and Northwestern University, and served in the Army from 1940 until last March, being discharged with the rank of major.

♦ ♦ ♦

Kenneth T. Fawcett has been appointed vice president of Dominion Brake Shoe Co. Ltd., a Canadian subsidiary of American Brake Shoe Co., New York. Mr. Fawcett is a native of Calgary, Alberta, and a graduate of Yale University. He has been associated with American Brake Shoe Co. since 1934 and has been assistant general purchasing agent since 1944.

♦ ♦ ♦

John E. Galvin, president, Ohio Steel Foundry Co., Lima, O., recently was named a vice president of the Ohio Manufacturers Association. **William J. Bennett,** secretary and treasurer, Buckeye Steel Castings Co., Columbus, O., was re-elected treasurer of the association.

♦ ♦ ♦

Robert Logie has been elected treasurer and assistant secretary, National Roll & Foundry Co., Avonmore, Pa., and will serve also as a board member. **Francis Nash,** formerly assistant secretary, has been made secretary. W. H. Seaman is president of the company.

♦ ♦ ♦

Oscar Blohm and **Marshall D. King** have purchased the former Koepke Foundry Co., 4537 W. Patterson Ave., Chicago 41, and have formed a partnership to operate it under the name of

(*Continued on page* 102)

A. C. MEYERS

H. OLIVER PELS

WALTER HORTH

J. W. WOLFE

UNIFORM WOODWARD IRON . . .

A Combination of Equipment and "Know-how"

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(*Continued from page* 100)

Triangle Foundry Co. High quality gray iron castings will be produced. Mr. Blohm, for the past six years chief metallurgist, Hills-McCanna Co., Chicago, and Mr. King, for nine years foundry superintendent with the same company, resigned from these pos's Dec. 15.

♦ ♦ ♦

Frederick Butzer, formerly supervisor in the magnesium foundry of the Dodge Chicago Plant, Chrysler Corp., has become associated with Lakey Foundry & Machine Co. Inc., Muskegon, Mich., as a supervisor in charge of three molding lines. Mr. Butzer began his foundry career at the Montague Castings Co., Muskegon, and later became an inspector of castings at Lakey Foundry & Machine Co. He spent some time at the Elizabeth St. Foundry Co., Chicago, until the war when he entered the Dodge Chicago Plant.

♦ ♦ ♦

Dante E. Broggi, vice president and director, Neptune Meter Co., New York, has been appointed general manager in charge of production, sales and research. Mr. Broggi was graduated from City College of New York, and joined Neptune Meter as a chemist and metallurgist in 1920. After holding various positions he was appointed factory manager. While superintendent of the foundry he became a member of the AFA and an authority on bronze castings.

♦ ♦ ♦

Norman F. Hindle has resigned from the staff of the American Foundrymen's Association to accept an appointment as professor of mechanical engineering, University of Idaho. A graduate of Purdue University, he joined American Steel Foundries in 1925, as laboratory chemist at its Alliance, O., plant. In 1926 he became chief chemist of the company's Indiana Harbor, Ind., plant, resigning that position in 1928, when he joined THE FOUNDRY, Cleveland, as assistant editor. He returned to American Steel Foundries in 1931 as chief process inspector and in 1933 went with the AFA at Chicago. He was appointed assistant technical secretary in 1936, technical secretary in 1938, and served as assistant secretary from 1940 to 1944, when he became director of the technical development program.

♦ ♦ ♦

James E. Kendig, who has been associated with Acme Aluminum Alloys Inc., Dayton, O., since 1941, as a member of its engineering staff, has been appointed manager of the company's recently established eastern sales division, with headquarters in South Philadelphia, Pa. The new office territory will include the eastern section of the United States, from Maine to North Carolina, and as far west as Pittsburgh. Mr. Kendig will have charge of sales and service on aluminum alloy castings in both sand and permanent molds, the company's tool and die division, pattern making and design or special engineering.

♦ ♦ ♦

Harvey N. Barrett Jr. has been appointed assistant to the president, Basic Refractories Inc., Cleveland. Mr. Barrett has been serving as manager of sales development since his return from military service. **Gordon E. Tomb,** assistant sales engineer for the Cleveland district, has been appointed manager of gun sales. **Hugh D. Largey,** district sales manager at Pittsburgh, has been made manager of refractory sales for the company. **D. B. Baxter** succeeds Mr. Largey at Pittsburgh. **George W. Edwards,** formerly melter at the Buffalo plant, Republic Steel Corp., has been made assistant sales engineer at Pittsburgh.

♦ ♦ ♦

Gerhardt Bartz has been appointed works manager, Bellevue Industrial Furnace Co., Detroit. Mr. Bartz, until recently assistant plant engineer, Dodge Forge Division, Chrysler Corp., Detroit, spent 17 years with that company. Previously he was associated with Western Electric Co., New York, Continental Motors, Muskegon, Mich., and Paasche Air Brush Co., Chicago, for 8 years.

♦ ♦ ♦

Stephen M. Shelton has been appointed chief of the Albany, Oreg., division, Bureau of Mines, where he will have charge of research in zirconium, carbothermic magnesium, iron-phosphate ores, iron-nickel ores, electrolytic zinc, and nonmetallic minerals. Mr. Shelton has been with the bureau's Foreign Minerals Division, and has worked closely with the State Department on Latin American mineral projects.

♦ ♦ ♦

Paul R. Pollock has been made manager of the Denver office of Allis-Chalmers Mfg. Co., Milwaukee. A graduate of Pennsylvania State College, Mr. Pollock joined Allis-Chalmers in 1936, serving in the company's Washington and Denver offices. Mr. Pollock succeeds **Henry H. Roth,** who has been transferred to generator sales of the motor generator sales section of the electrical department at the main works in West Allis, Wis.

♦ ♦ ♦

Oscar Frohman has been appointed general sales engineer, Ampco Metal Inc., Milwaukee, succeeding **James Arter,** who has been made assistant to the general manager. Mr. Frohman, who was formerly manager of market development, will continue necessary activity in that capacity.

♦ ♦ ♦

Roger W. Griswold Jr., recently vice president of the Griswold Mfg. Co., Erie, Pa., has resigned from the company. An eastern syndicate recently acquired the Griswold company.

♦ ♦ ♦

R. U. Jackson, formerly manager of the Charleston, W. Va., office, Robins Conveyors Division, Hewitt-Robins Inc., Passaic, N. J., has been made co-ordi-

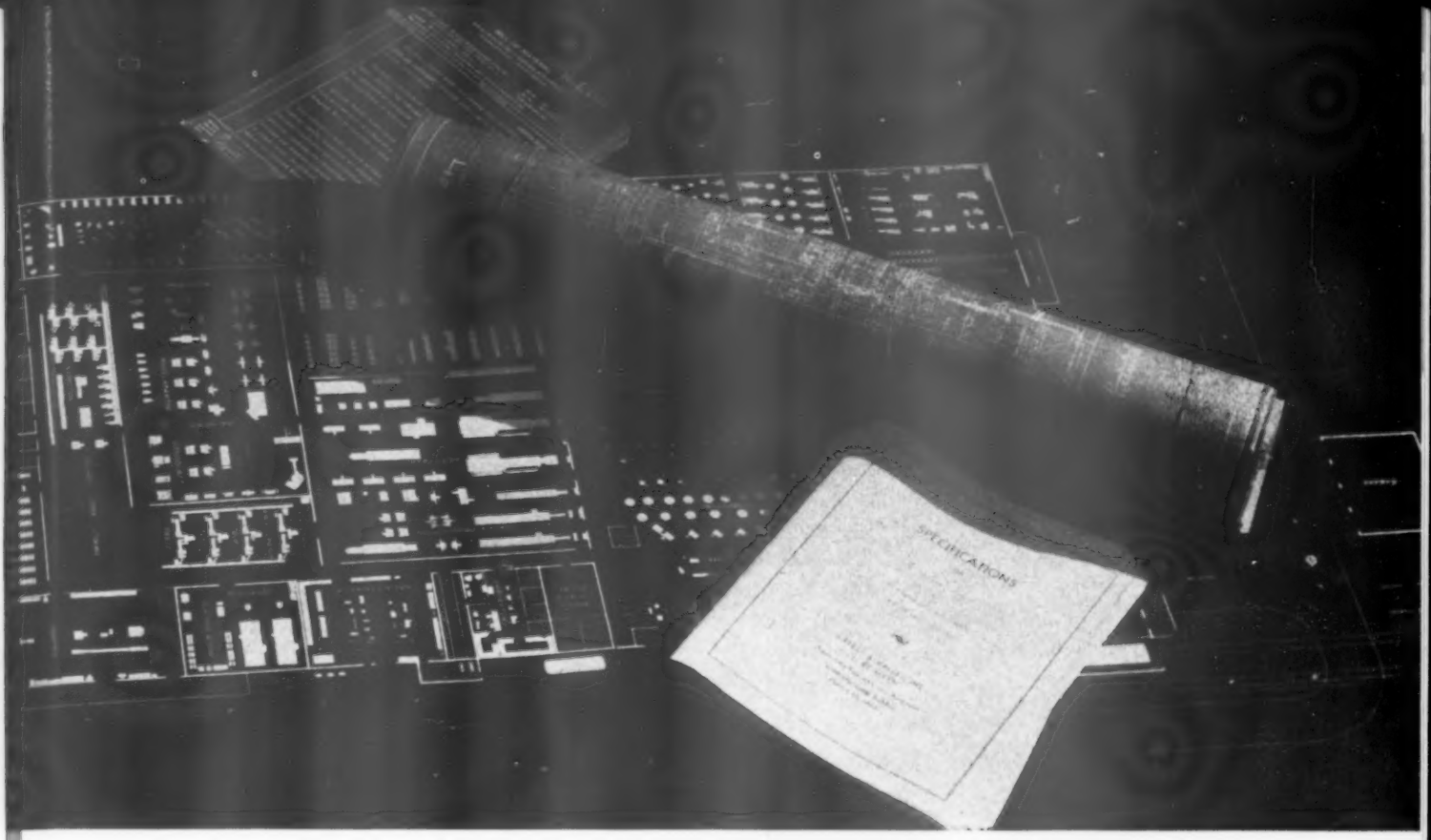
(*Continued on page* 106)

FREDERICK BUTZER

NORMAN F. HINDLE

DANTE E. BROGGI

JAMES E. KENDIG



MONEY SAVING TOOLS

Layouts, drawings, specifications, bills of material. These documents, prepared by Giffels & Vallet, Inc., represent condensed experience gained in engineering foundry projects for more than twenty years. They are the plan of attack for building toward lower production costs. They are the tools used to acquire competitive prices on equipment, materials, and construction labor. They represent designs in which the engineering has been integrated so that delays and costly field changes are eliminated. These tools are available to you for the development of your plans for new foundries or for expansion and modernization programs.

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PUT YOUR CASTINGS *in a cleaning test tube*

When you bring your products to our demonstration laboratory we can show you exactly what type of cleaning machine is best suited to your cleaning problem and to the production volume you want to handle. Everything is here to give you the complete facts needed to compare your present practice, or any other cleaning method, with the results you can get with the world-famed airless Wheelabrator.

If you've been thinking about improving your cleaning practice and have been debating the pros and cons of various cleaning methods, here is a perfect opportunity to get positive facts. Hundreds of others like yourself have put the Wheelabrator to this test and it has proved, by convincing demonstration, why it is used in more plants than any other type of blast cleaning equipment. Let us arrange for such a test today.

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How a typical problem was solved in the WHEELABRATOR laboratory

A southern manufacturer of farm equipment wanted to speed up production and reduce costs in cleaning gears, guards, discs, frames, wheels and miscellaneous grey iron castings. Weight per piece ranged from a few ounces to 160 lbs. Castings were shipped to us for test, the result of which showed that a 48″ x 42″ Wheelabrator Tumblast and a 66″ Wheelabrator Swing Table would handle the entire production in record time and at greatly reduced cost. The Tumblast cleaned 100 light pieces in 3 minutes; 18 medium sized pieces in 5 minutes; and 10 heavy pieces in 8 minutes. Loads cleaned in this machine ranged from 500 to 1200 pounds. The Swing Table cleaned heavy mower frames in 8 minutes. All work was cleaned to a bright uniform finish.

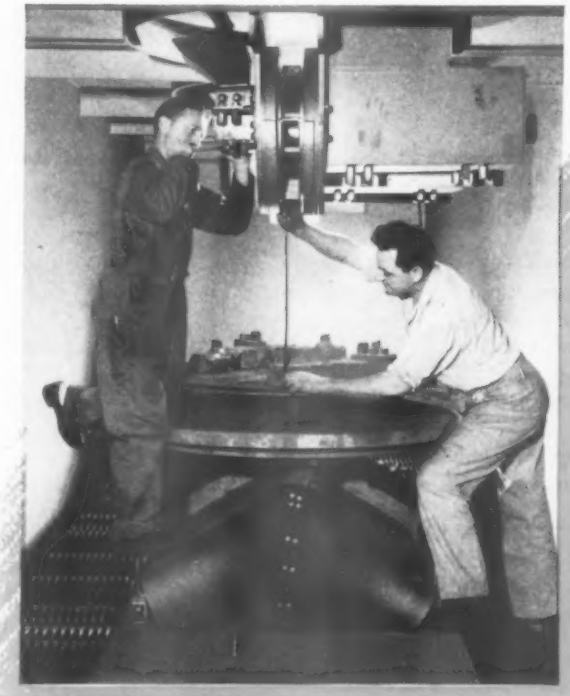


Fig. A

Fig. B

These two photos illustrate a typical customer demonstration. In Fig. A several mechanics are arranging a Wheelabrator test unit to simulate a machine designed to rotate work about a vertical axis. Fig. B shows customers witnessing the result of the cleaning test.

American

WHEELABRATOR & EQUIPMENT CORP.

(FORMERLY AMERICAN FOUNDRY EQUIPMENT CO.)

505 S. Byrkit St., Mishawaka, Indiana

(*Continued from page* 102)

nator of mine conveyor sales. **J. W. Wantling** replaces Mr. Jackson as manager of the West Virginia office.

♦ ♦ ♦

D. W. Drummond has been elected vice president-general manager of sales, and **Arthur T. Bennett,** vice president-general manager of operations, Mathieson Alkali Works Inc., New York. Mr. Drummond, a graduate of University of Pennsylvania, joined the Mathieson organization in 1938, as assistant sales manager of the carbon dioxide division, and was made manager a year later. He became assistant sales manager of company sales and at the time of his new appointment was company sales manager. Mr. Bennett attended Cass Technical School, Detroit, Detroit University, and Syracuse University. In 1933 he joined Mathieson as technical assistant. Subsequently he served as superintendent of the soda ash department at the Lake Charles, La., plant, assistant manager at the Saltville, Va., plant, assistant director of operations, New York and in 1943, general manager of operations.

♦ ♦ ♦

H. L. McMurry and **W. R. Ousley** have formed a partnership, H. L. McMurry & Co., Jacksonville, Fla., and will represent the American Air Filter Co. Inc., Louisville, in handling air filtration and dust control equipment for the Florida area. Mr. McMurry, a graduate of University of Wisconsin, has resided in Florida for the last 20 years, 12 of which have been spent as a manufacturer's agent. Mr. Ousley attended Georgia State College and has had wide experience in industrial engineering. He has been associated with Alexander Orr Jr. Inc., Miami, Fla., for 11 years as chief cost estimator and office manager in charge of heating, ventilation, steam distribution and power plant construction. He will be located at Miami and will handle equipment in that district.

V. J. Rauer has been appointed supervisor of production, metallurgy division, General Electric Chemical Department, Pittsfield, Mass. **G. M. Patton** has been named supervisor of planning and wage rate, and **R. G. Mussen,** supervisor of test and inspection. **J. C. Morrison** becomes assistant general foreman, and **R. L. Beilhart, P. J. Moola, J. F. Pickert, J. H. Yeomans** and **E. A Rees,** foremen, of the division

♦ ♦ ♦

Carborundum Co., Niagara Falls, N. Y., has announced the retirement of the following executives, who are veteran employees: **Charles Knupfer,** senior vice president; **T. B. Foot,** assistant secretary; **George W. Chromann,** associate manager, engineering and products development division, and **George H. Huntley,** who has been serving in an advisory capacity.

♦ ♦ ♦

Robert M. Conklin, until recently development engineer, Western Electric Co., New York, has joined the staff of Battelle Memorial Institute, Columbus, O., where he will be engaged in research on production materials and processes.

♦ ♦ ♦

Col. Harry A. Montgomery, awaiting retirement after 28 years with the Army Corps of Engineers, has been appointed vice president and chief engineer, Material Service Corp., Chicago.

♦ ♦ ♦

Earl T. Ball, sales engineer, Electric Hose & Rubber Co., Wilmington, Del., for the last 5 years, has been appointed sales manager, Air-Way Pump & Equipment Co., Chicago.

♦ ♦ ♦

C. W. Tuttle has been appointed purchasing agent, Indiana Foundry Corp., Muncie, Ind.

♦ ♦ ♦

Francis J. Wakem has been appointed vice president, Johns-Manville Corp., New York, Mr. Wakem will continue as merchandise manager of the Industrial Products Division. A graduate of Yale University, he became associated with Johns-Manville in 1921.

♦ ♦ ♦

Charles E. Fralick has joined Lester B. Knight & Associates, Chicago, as assistant to **Edgar E. Ballard,** senior engineer in charge of development and installation of foundry facilities for foundry modernization programs. Previously Mr. Fralick was chief engineer, foundry equipment division, Whiting Corp., for more than 20 years, handling equipment and with all types of mechanical charging and ferrous melting units. **D. E. Gilman** has also joined Lester B. Knight & Associates as a survey and industrial engineer. A graduate of the University of Pennsylvania, Mr. Gilman spent a year and a half with the Carnegie-Illinois Steel Corp., and later installed incentive plans and standard cost systems while working for Norris & Elliott, industrial engineers, and for Gunite Foundries, Rockford, Ill., where he became assistant to the works manager. His most recent connection was with J. I. Case Co., where he was engaged in a foundry modernization and expansion program.

♦ ♦ ♦

Leo G. Miller, superintendent, Lebanon Steel Foundry, Lebanon, Pa., has been appointed plant manager in charge of operations, Lebanon Steel Foundry, Lebanon, Pa., succeeding **Frank J. Stanley,** who has resigned.

♦ ♦ ♦

Harry E. Orr has been appointed general manager of operations of the Bridgeville, Pa., and Niagara Falls, N. Y., plants, Vanadium Corp. of America.

♦ ♦ ♦

Stanley C. Hope, president, Gilbert & Barker Mfg. Co., Springfield, Mass., has also been elected president of Stanco Inc., Linden, N. J. Both companies are affiliates of Standard Oil Co. (New Jer-

(*Concluded on page* 108)

H. L. McMURRY

W. R. OUSLEY

ARTHUR T. BENNETT

D. W. DRUMMOND

SLY TUMBLING MILLS

The SLY name on your Tumbling Mills has been the Standard of Sturdiness for many years.

Modern Design Throughout

Anti-Friction Bearings — Direct Motor Drive

Sturdy Construction for

Long Life — Low Maintenance

SLY TUMBLING MILLS
Can be Furnished as Follows:

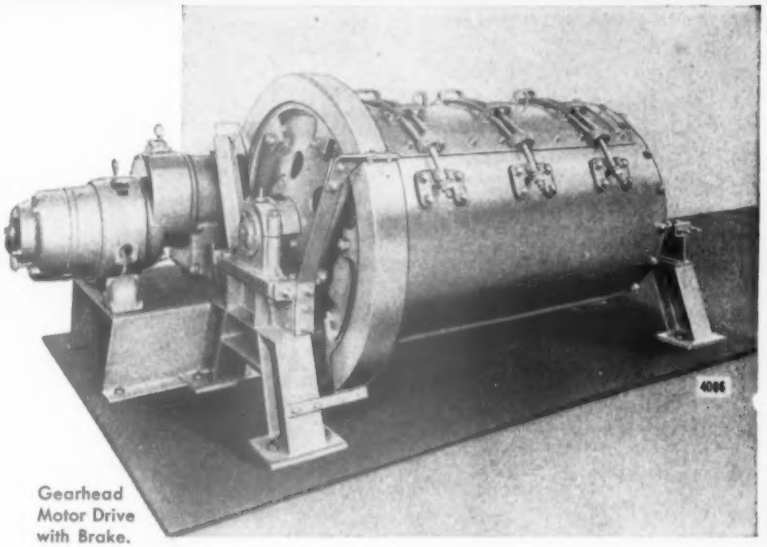
Inside diameters: 24″, 30″, 36″, 42″, and 48″.
Inside length from 36″ up.

Special Designs for

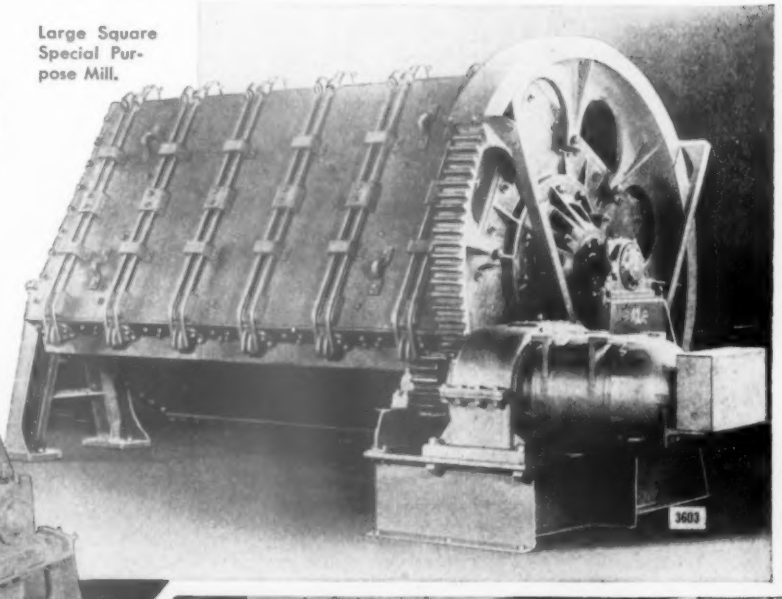
Stove Plate	Sprue Cleaning
Soil Pipe	Welding Rods
Waterpipe Fittings	Cast Anchor Chain

Drives for Mills

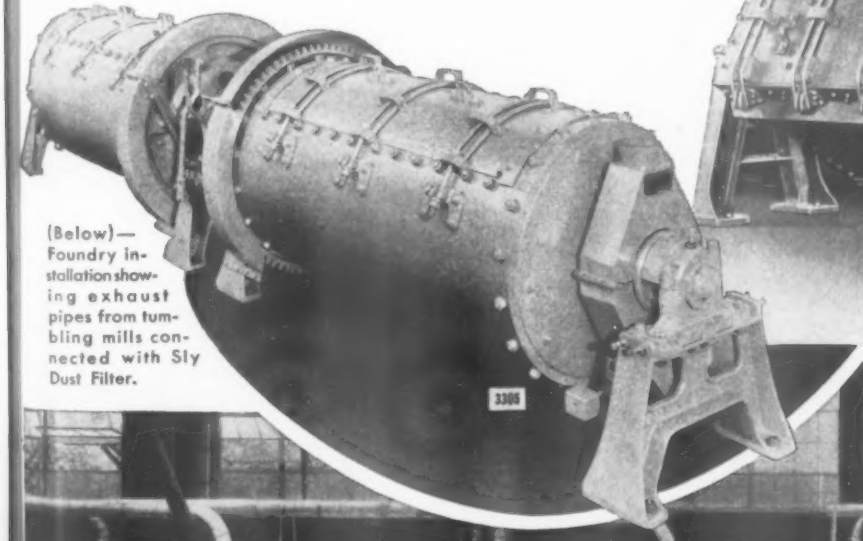
For greatest flexibility we recommend individual direct motor drive, but mills can also be furnished with V-belt drive, or tight and loose pulley for flat belt drive.



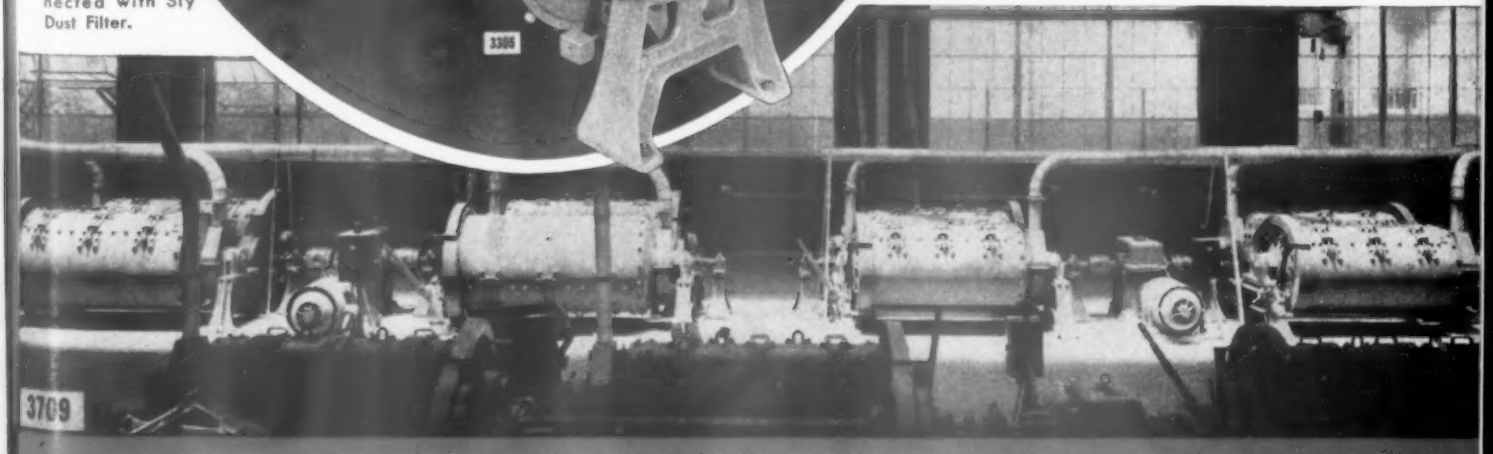
Gearhead Motor Drive with Brake.



Large Square Special Purpose Mill.



(Below)—Foundry installation showing exhaust pipes from tumbling mills connected with Sly Dust Filter.



THE W. W. SLY MANUFACTURING CO.

Appoint Members to AFA Committees

J. B. Caine, metallurgist, Sawbrook Steel Castings Co., Cincinnati, has been appointed head of the 1946-47 mold surface committee, sand division, American Foundrymen's Association.

Other members are: J. A. Rassenfoss, research metallurgist, American Steel Foundries, East Chicago, Ind.; Harry W. Dietert, president, Harry W. Dietert Co., Detroit; Francis S. Brewster, metallurgist, Dowmetal Foundry, Dow Chemical Co., Bay City, Mich.; K. J. Jacobson, assistant chief chemist, Griffin Wheel Co., Chicago; H. M. Kraner, ceramic engineer Bethlehem Steel Co., Bethlehem, Pa.; E. C. Troy, metallurgist, Dodge Steel Co., Philadelphia, and L. B. Osborn, Houghland & Hardy Inc., Evansville, Ind.

New chairman of the 1946-47 brass and bronze division program and papers committee is Walter W. Edens, foundry superintendent, Ampco Metal Inc., Milwaukee. George P. Halliwell, director of research, H. Kramer & Co., Chicago, is vice chairman.

Other members are Dr. Robert M. Brick, director, department of metallurgy, University of Pennsylvania, Philadelphia; J. F. Ednie, chief metallurgist, Duquesne Smelting Corp., Pittsburgh; G. K. Eggleston, Barnes Mfg. Co., Mansfield, O.; A. H. Hesse, chief research metallurgist, R. Lavin & Sons Inc., Chicago, and R. W. Parson, chief metallurgist, Ohio Brass Co., Mansfield.

Book Review

Steel Castings, by Eric N. Simons, cloth, 206 pages, 7½ x 5 in.; published by Paul Elek Publishers Ltd., 37 Hatton Garden, London, E. C. 1. Price 13 s.

In this little volume the author has collected and presented considerable information on various factors connected with the production of steel castings. The author indicates that he has attempted to clarify and simplify, to condense and compress, and that the aim has been exposition rather than originality, interpolation rather than "blinding 'em with science." Because of its non technical approach, the book probably will be of more interest to the student on steel castings than to the technical management of the steel foundry.

Chapter headings are: The Raw Material, Melting Processes, Patterns, Foundry Sands, Mold and Cores, Centrifugal Casting of Steel, Post Casting Processes, Heat Treatment, Machining, Inspection and Testing, Steels for Castings, Buying and Packing Steel Castings and Interesting Steel Castings. This last chapter shows pictures of typical steel castings, the author's purpose being to indicate what the founders of Great Britain can do.

Stress Group Holds Chicago Meeting

Society for Experimental Stress Analysis will hold its next meeting, including a symposium on shock and impact, at the Stevens Hotel, Chicago, May 15-17. Inquiries should be addressed to the society at P. O. Box 168, Cambridge 39, Mass.

(*Concluded from page* 106)

sey.) Mr. Hope succeeds **F. W. Moss**, who continues for another year, before retirement, in an advisory capacity on foreign marketing activities.

♦ ♦ ♦

William M. Hufnagel, since 1943 district sales engineer, Link-Belt Co., Chicago, has been appointed sales manager in charge of a new district sales office recently opened by the company in Milwaukee. Mr. Hufnagel has been serving a portion of this sales territory from the Chicago office. He joined Link-Belt in 1924, as a part-time employee at the Ewart plant in Indianapolis. In 1927 he became a draftsman in the engineering department of that plant and was transferred to the Dodge plant there in 1935. The following year he joined the positive drive sales department in Chicago. **H. B. Johnson** and **F. E. Sweeney** will assist Mr. Hufnagel in the new Milwaukee office.

♦ ♦ ♦

T. E. Anderson has joined the sales organization of the Ohio Ferro-Alloys Corp., Canton, O. Mr. Anderson previously had been associated with the industrial sales division, Pittsburgh district, of National Gypsum Co., Buffalo.

♦ ♦ ♦

C. E. Herington has been appointed manager of the sales engineering department, Meehanite Metal Corp., New Rochelle, N. Y. Mr. Herington has been director of advertising and sales promotion and will continue these duties along with the direction of a new sales engineering department which has been established to provide an advisory engineering service to users of castings. The department will assist them in solving problems involving application, design and source of supply of castings made by the Meehanite process.

♦ ♦ ♦

Joseph O. Houze, formerly vice president of National Malleable & Steel Castings Co. at Chicago, was elected mayor of Clearwater, Fla., Dec. 18. Mr. Houze retired from the company six years ago.

♦ ♦ ♦

A. J. Sandorff has resigned as sales manager, General Abrasive Co., Niagara Falls, N. Y.

WILLIAM M. HUFNAGEL

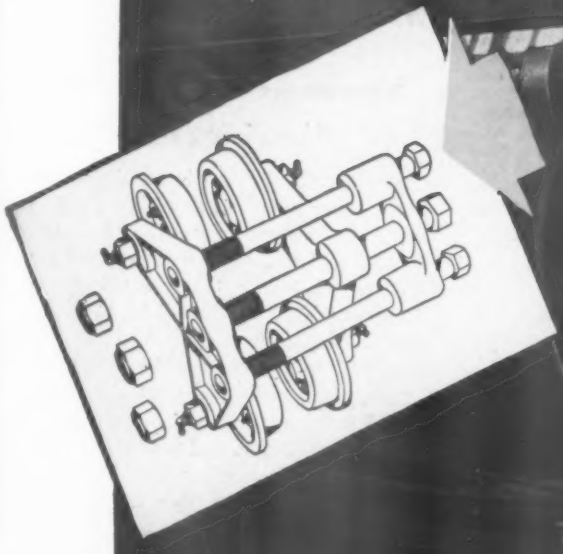
T. E. ANDERSON

C. E. HERINGTON

Don't overlook the MOVE factor in hoisting..

LIFT

LOWER



We've told you about the lifting and lowering features of our hoists, how the air motor is ideal for hot, gaseous atmosphere—the graduated throttle valve that gives instant and complete control—the automatic safety up-and down-stop—the automatic brake for holding loads, etc. But, we have taken one feature too much for granted and that has been our Articulated Type Trolley.

The trolley provides the MOVE in hoisting. If it is not a smoothly operating trolley, it can account for more than one headache and many minutes lost.

Briefly, here's what we want you to know about the I-R hoist trolley:

1—One bracket is rigid to stabilize the hoist and the other bracket is hinged, thus—
2—The load is always equalized on all four wheels.
3—The spherical wheel treads give one point contact for easy rolling and permit use on beams with flat or sloped flanges.
4—The trolley wheels have a hardened and ground tread and are fitted with—
5—High-grade ball bearings to provide smooth movement.

Our Industrial Air Motor Hoists are available in capacities from 300 to 20,000 pounds. Units can be furnished with a plain or hand-chain-driven trolley (both articulated) in place of the standard top hook. A four-wheel-drive, air-motor-driven trolley is also available.

Write for full particulars on Ingersoll-Rand Air Hoists.

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8-833

CONVENTION COMMITTEES

Appointed by Detroit Chapter

DETROIT Chapter of the American Foundrymen's Association is busy with preparations for the 51st annual national convention to be held in that city, April 28 through May 1. Committees have been appointed to handle various features of the convention program, including plant visitations, the annual banquet and entertainment of ladies.

A Committee on Regional Participation is composed of members of other nearby AFA chapters—Saginaw Valley, Western Michigan, Michiana and Toledo—which are expected to participate actively in the convention. Because of the availability of a number of modern automotive foundries in the Detroit area visitors are expected to take more than the usual interest in plant visitations which are being planned by a special committee.

Members named to the various committees are as follows:

General Committee

Honorary chairman, F. J. Walls, International Nickel Co.; general chairman, A. H. Allen, THE FOUNDRY; vice chairman, C. E. Silver; treasurer, W. W. Bowring, Frederic B. Stevens Inc.; secretary, R. E. Cleland, Eastern Clay Products Inc.; assistant secretary, C. L. Gorney.

Plant Visitation Committee

Chairman, H. M. Bringhurst, Semet-Solvay Co.; vice chairman, John Linabury, General Motors Corp.; Nelson Smith, Dodge Division Chrysler Corp.; J. E. Coon, Packard Motor Car Co.; W. V. Leonard, Wilson Foundry & Machine Co.; Ralph Hippler, Detroit Gray Iron Foundry Co.; J. M. Duncan, Detroit Steel Casting Co.; Harold Schroeder, Michigan Steel Casting Co.; Jack Efrusy, Swedish Crucible Steel Co.; L. H. Middleditch, Central Foundry Co.; F. R. Mason, Riley Stoker Co.; Don Christian, Acme Foundry Co.; J. L. Mahon, American Car & Foundry Co.; L. G. Korte, Atlas Foundry Co.; O. E. Sundstedt, General Foundry & Mfg. Co.; H. B. Updegraff, Aluminum Co. of America; A. G. Baker, Michigan Malleable Iron Co.; P. J. Potter, Federal Mogul Corp.; N. D. Devlin, Rotary Electric Steel Co.; D. C. Amburn, Pontiac Motor Division; L. C. Beers, Claude B. Schneible Co.

Publicity Committee

Chairman, C. E. Silver; W. N. Seese, J. S. McCormick Co.; W. G. Patton, *Iron Age*; C. J. Rittinger, American Car & Foundry Co.; J. P. Mullen, AFA, Chicago; R. E. Cleland, Eastern Clay Products Co.; R. L. Lee, General Motors Corp.; R. E. Jacobs, Whiting Corp.

Finance Committee

Chairman, W. B. Crawford, Atlas Foundry Co.; vice chairman, W. W. Bowring, Frederic B. Stevens Inc.; E. C. Hoenicke, Eaton Mfg. Co.; C. B. Schneible, Claude B. Schneible Co.; H. W. Dietert, Harry W. Dietert Co.; J. P. Carritte Jr., True Alloys Inc.; J. B. Neiman, Federated Metals Division, American Smelting & Refining Co.; Glenn Coley, Detroit Edison Co.

Banquet Committee

Chairman, W. J. Cluff, Frederic B. Stevens Inc.; R. J. Wilcox, Michigan Steel Casting Co.; A. W. Stolzenburg, Aluminum Co. of America; W. B. McFerrin, Electro Metallurgical Sales Corp.; R. L. Orth, American Wheelabrator & Equipment Corp.

Reception Committee

Chairman, W. J. Muhlitner, Great Lakes Foundry Sand Co.; vice chairman, C. H. Miller, Standard Pattern Works; C. D. Yahne, Wolverine Foundry Supply Co.; M. A. Meier, L. A. Cohn & Bros. Inc.; W. E. Thompson, Warner R. Thompson Co.; D. T. Hay, A. T. Wagner Co.; Elton Rogers, E. J. Woodison Co.; J. C. Alpeters, Crescent Brass & Pin Co.; Frank Dodge, Werner G. Smith Co., Cleveland; F. A. Jensen, National Engineering Co.; Elmer Blake, Osborn Mfg. Co.

Committee on Regional Participation

Chairman, C. C. Sigerfoos, Michigan State College; John Grennan, University of Michigan; J. F. Smith, (Saginaw Valley) Chevrolet Gray Iron Foundry, Division of General Motors Corp.; Rudolph Flora, (Western Michigan) Clover Foundry Co.; John McAntee, (Michiana) Covel Mfg. Co.; B. L. Pickett, (Toledo) Unitcast Corp.; H. J. Miller, Walker Metal Products, Walkerville.

Shop Course Promotion Committee

Chairman, R. G. McElwee, Vanadium Corp. of America; vice chairman, G. L. Galmish, Michigan Malleable Iron Co.; C. H. Hungerman, Cadillac Motor Car Division, General Motors Corp.; E. V. Ivanso, Steel Sales Corp.; R. W. Mason Jr., International Nickel Co.; W. C. Morgan, E. F. Houghton Co.; P. M. Sanders, consulting metallurgist; Don Christian, Acme Foundry Co.; A. W. Stolzenburg, Aluminum Co. of America; M. J. Warchol, Atlas Foundry Co.; J. H. Bondie, Budd Wheel Co.; J. G. Eberhardt, Central Specialty Co.; E. A. Petersen, Dodge Bros. Division, Chrysler Corp.; H. A. Kelley, City Pattern Foundry & Machine Co.; J. H. Bothwell, Detroit Brass & Malleable Works; Ralph Hippler, Detroit Gray Iron Foundry Co.; George P. Holman, Detroit Steel Casting Co.; E. V. Neeb, Eaton Mfg. Co.; D. J. Unger, Federal-Mogul Corp.; E. C. Jeter, Ford Motor Co.; G. J. Delisle, Kelsey-Hayes Wheel Co.; A. G. Baker, Michigan Malleable Iron Co.; H. W. Schroeder, Michigan Steel Casting Co.; J. E. Coon, Packard Motor Car Co.; D. C. Amburn, Pontiac Motor Div.; C. J. Rittinger, American Car & Foundry Co.; L. C. Beers, Claude B. Schneible Co.; G. H. Quinn, Frederic B. Stevens Inc.; Al Drescher, United Brass & Aluminum Co.; B. F. Emrick, U. S. Radiator Corp.; H. J. Miller, Walker Metal Products Co. Ltd.; R. E. Rutzen, Wilson Foundry & Machine Co.; F. R. Mason, Riley Stoker Corp.; Jess Toth, Harry W. Dietert Co.

"Ford Day" Committee

Chairman, R. H. McCarroll; E. C. Jeter, G. Vennerholm, R. W. Greene, Jack Mullaly, all of Ford Motor Co.

Ladies' Entertainment Committee

Co-chairmen, Mr. and Mrs. Harry W. Dietert; vice chairmen Mrs. A. H. Allen, Mrs. C. E. Silver, Mrs. W. W. Bowring, Mrs. R. E. Cleland; secretary, Charlotte L. Gorney. Also Mrs. Omer L. Allen; Mrs. Pierce Boutin; Mrs. J. P. Carritte Jr.; Mrs. J. E. Coon; Mrs. G. C. Creusere; Mrs. G. L. Galmish; Mrs. E. C. Hoenicke; Mrs. J. E. Linabury; Mrs. R. G. McElwee; Mrs. R. L. Orth; Mrs. W. N. Seese; Mrs. Gosta Vennerholm; Mrs. R. J. Wilcox.

Seek Improvement in Industrial Relations

While expressing confidence that new legislation eventually will go far in restoring industrial harmony, speakers at the 47th anual convention of the National Metal Trades Association in New York, Nov. 14-15, suggested measures whereby management, as well as labor, could be more effective in bringing about a closer and improved relationship between employers and employees.

Clarence-B. Randall, vice president, Inland Steel Co., Chicago, urged careful introspection by management in matters of employee relationships, and emphasized that this is not the time for a "return to old thinking," or a period of denouncing others "until we know we ourselves are right." Management, he said, still has something to fight with and has much to fight for, but it first must be sure that "its own house is in order." On such premise, he and other speakers outlined steps which they believed management should take in the interest of a better relationship with labor, and also in the interest of a better public understanding.

Discussions attracted approximately 700 executives in the metalworking field, and highlighted such subjects as managements' rights and free speech, government seizure and collective bargaining, foremen, war veterans in industry and "travel time pay."

Sponsors Canadian Conference

Registration for the first All-Canadian Conference, sponsored jointly by the Eastern Canada-Newfoundland, and Ontario Chapters of the AFA, will be held Feb. 28 through March 1 at the Royal York Hotel, Toronto, which will be headquarters for the conference.

Plant visitations have been arranged at gray iron, malleable, steel and nonferrous foundries which will be open for inspection, at 10 a.m. and 2:30 p.m., on the first day. Chapter officers and AFA headquarters guests will deliver short addresses at luncheon meetings scheduled for the two days, and Prof. J. C. Cameron, Queens University, Kingston, Ont. will be guest speaker at the banquet to be held at 6:30 p.m., on Friday.

Group sessions sponsored by Eastern Canada-Newfoundland Chapter, at 10-11:30 a.m., will precede the Saturday luncheon, followed by sessions at 2:30-4 p.m., sponsored by Ontario Chapter.

AFA Refractories Committee Named

Richard H. Stone, sales manager, Vesuvius Crucible Co., Pittsburgh, is chairman of the 1946-47 refractories committee of American Foundrymen's Association. Other members are C. E. Bales, vice president, Iron Fire Brick Co., Ironton, O.; J. A. Bowers, melting superintendent, American Cast Iron Pipe Co., Birmingham; Carl F. Joseph, technical director, Central Foundry Division, General Motors Corp., Saginaw, Mich.; A. S. Klopf, general manager, Western Foundry Co., Chicago, and Robert H. Zoller, president, Zoller Casting Co., Bettsville, O.

CROWN HILL

QUALITY SEACOAL

WORKS 8 WAYS

Flashes quickly; complete combustion; leaves scarcely a trace of sulphur; eliminates clogged vents; permits pores to open freely; permits rapid escape of gas; insignificant ash residue; gives clean skin to casting, thus cutting finishing costs. A seacoal facing that works 8 ways *should* be popular . . . and that's why CROWN HILL QUALITY SEACOAL *is* popular.

THE FEDERAL FOUNDRY SUPPLY COMPANY

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IN TWIN CITIES: The Foundry Supply Co., Inc., 2295 University Ave., St. Paul 4, Minn. IN SOUTHWEST: Beaumont Cement Sales Co., Houston & Beaumont, Texas, and Harvey, La.

Readers' Comment . . .

Smallest Foundry in U.S.?

To The Editors

I must operate the smallest foundry in the U. S. My shop is in a garage 12 x 16 ft and that includes molding room, coreroom, furnace room and cleaning room. I can't take production work but I did jobbing work during the war and turned out as high as 2 tons of brass, bronze and aluminum castings all alone. There was no help of any kind and I did my own delivery.

I have worked in foundries since 1886 (60 years). Now I am too old to work in production shops, so I started my own shop in 1936 and am making a good living at 74. I have to because I have no Social Security. I was born 30 years too soon.

Henry Lindroth

1740 *Fair Plain Ave.*
Benton Harbor, Mich.

White Coating Forms

To The Editors

It always is a pleasure to receive an issue of The Foundry and to read the splendid articles. As important as the articles are the "Questions and Answers" in each issue. In the December issue on page 112 I noticed a question about plaster molding which in the answer recommended that the 85-5-5-5 alloy be used.

My experience has been that when this alloy is used there will be a coating on the surface which will have to be removed with a wire brush. In order to obtain a smooth, mirror-like surface I would recommend the use of a manganese bronze, an aluminum bronze, or a silicon bronze. While some of these alloys present shrinkage problems, good sound castings will result if the proper attention is given to feeding and to directional solidification.

Fred Chambers
District Manager

National Gypsum Co.
Luckey, O.

Foundry Terminology

To The Editors

We have received from one of our Canadian students the following paragraph in which he uses the different foundry terms in a humorous way:

It is evident that the main thing in molding is to have the SAND to start at such a job, and then PATTERN your life accordingly. You will have plenty to COPE with but if you have a little DRAG you'll get by. However, if a molder starts hitting the FLASK too often, he soon hasn't the METAL to do his job, and he is ultimately sent to the PAY OFFICE to make his last DRAW.

Pour thing.

P. S. Don't let your wife or girl friend read the above, it might be enough to GAGGER.

His name is Fred Hall, Jr., 64 Norman Ave., Hamilton, Ont., Canada. I thought that you might be interested in his effort.

F. W. Brady,
Director

School of Shop Practice
International Correspondence Schools
Scranton 9, Pa.

Malleable Industry Award Is Created

ESTABLISHMENT of an honorary award known as the Charles H. McCrea Medal, to be given annually to the individual rendering most meritorious service to the malleable iron industry, has been announced by the Malleable Founders' Society.

The medal is presented to the society by the National Malleable & Steel Castings Co., Cleveland, in memory of its late president, an outstanding figure in the industry and a director of the Malleable Founders' Society from 1939 until his death in 1946. The recipient will be chosen each year by a committee of five members of the society, with the president as chairman, and presentation will be made at the annual meeting in June.

The purpose of the award, according to the society, is "to encourage and stimulate individual effort in the progress and development of the arts and sciences practiced in the production of malleable iron castings." No restriction is placed upon the field of endeavor within the industry beyond rendering meritorious service. Candidates must be employed by a member company of the society or by its staff.

NATIONAL MALLEABLE AND STEEL CASTINGS COMPANY
CHARLES H. McCREA MEDAL
FOR MERITORIOUS SERVICE IN BEHALF OF THE MALLEABLE IRON CASTINGS INDUSTRY
AWARDED TO

The Malleable Founders' Society was formed in 1897 "on the basis of improving the product and trying to make certain that every malleable casting made is of the highest quality."

Nickel Import Duty Cut Is Sought

Nickel is listed as one of the products to be considered for granting of tariff concession to Canada and other countries in forthcoming reciprocal trade agreement negotiations.

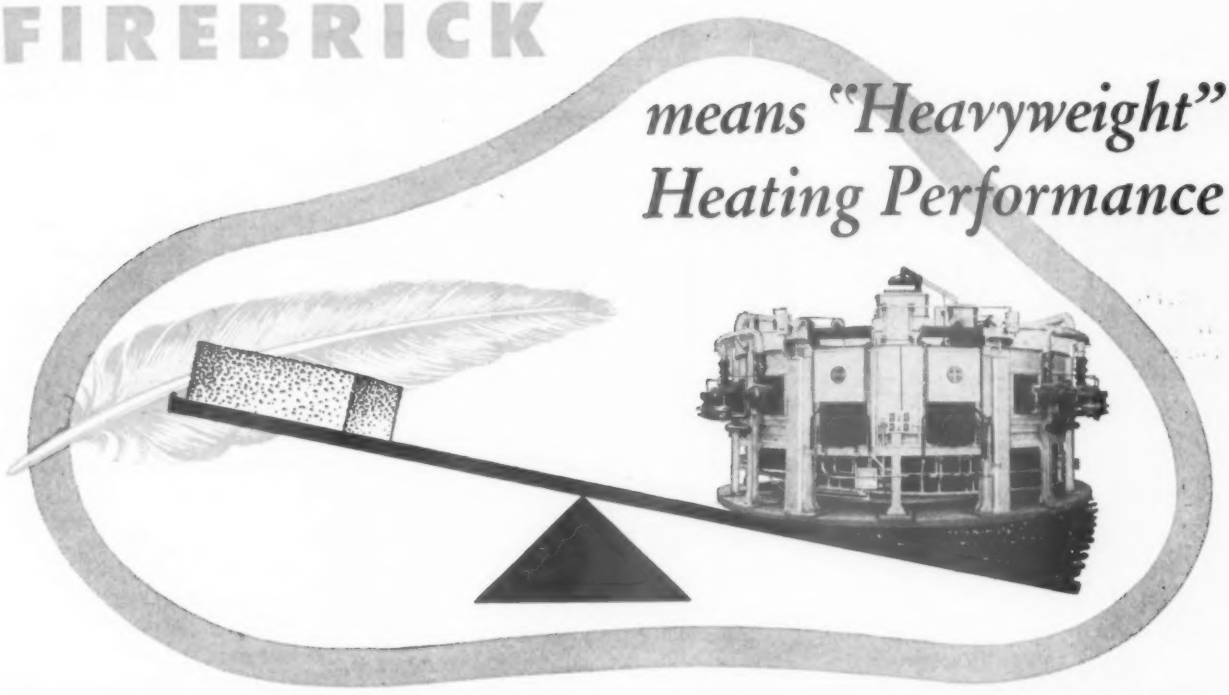
Tariff reductions of 50 per cent from those in effect Jan. 1, 1945, are permitted by law. This would result in a reduction of 1¼ cents per pound in price of nickel, for the International Nickel Co. has announced that elimination or reduction of the 2.5 cents import duty will accrue entirely to consumers. Should this duty be withdrawn completely, savings to domestic consumers would approximate $2.5 million annually, and will aid manufacturers in their efforts to keep prices in line in face of other rising production costs.

No nickel is mined or refined in the United States and therefore the so-called duty is not a protective tariff. For this reason some major users believe there will be little opposition to the reduction of present nickel import duty. There appears to be no justification for retention of what in reality is a revenue tax on a strategic metal.

The foundry industry is interested in removal of the entire import duty, for it is estimated 15 per cent of all nickel imported in the United States is consumed in heat resisting castings, iron, steel and nonferrous castings. Representations have been made to the Committee for Reciprocity Information in Washington by the Alloy Casting Institute, Gray Iron Founders Society, Rolling Mill Machinery and Equipment Association, and other trade associations. Many member companies of the above societies have written individual letters urging elimination of this tariff on nickel.

LIGHTWEIGHT INSULATING FIREBRICK

means "Heavyweight" Heating Performance

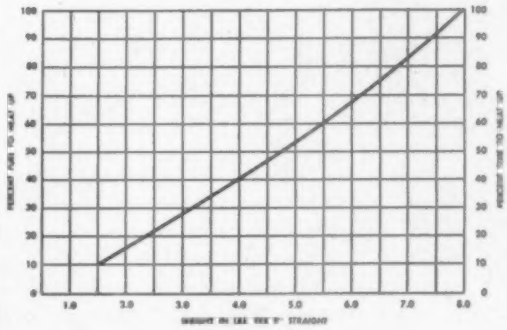


Look to *lightness* in insulating firebrick for lower heat loss, faster heating-up time, minimum fuel consumption and reduced over-all operating costs. And when looking for lightness—remember that *B&W I.F.B. are the lightest in their class.*

Here's an example, based on actual experimental data, that shows how the weight factor can affect the performance of your furnaces:

In a furnace, 12" deep by 40" wide by 13½" high tests were run using brick linings of different weights. With each lining, the hearth was constructed of heavy firebrick and the heat liberation was kept constant (30,000 Btu/sq. ft./hr.).

The curve at the right shows the results of these tests. For instance, the furnace when lined with an insulating firebrick weighing 3 pounds per nine-inch straight requires 180% more time and 180% more fuel to heat up than when lined with insulating firebrick weighing only 1½ lbs.!



Equally as important as their light weight—B&W I.F.B. afford close temperature control, more uniform heating. This is because their low heat storage capacity and low conductivity permit the hot-face temperature to respond speedily to the rate of furnace heat input. The result — more uniform product quality.

Throughout the country, B&W Refractories Engineers are guiding progressive industries to lower production costs through more efficient furnace operations. Why not let them help you choose the right cost-cutting B&W Refractory for your furnaces? A call or a postcard today will bring him . . . or for more information on B&W Insulating Firebrick, write for Bulletin R-2-H.

R-263

Water-Tube Boilers, for Stationary Power Plants, for Marine Service . . . Water-Cooled Furnaces . . . Superheaters . . . Economizers . . . Air Heaters . . . Pulverized-Coal Equipment . . . Chain-Grate Stokers . . . Oil, Gas and Multifuel Burners . . . Seamless and Welded Tubes and Pipe . . . Refractories . . . Process Equipment.

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Around DETROIT

By A. H. ALLEN
Detroit Editor
THE FOUNDRY

Use of investment castings for automotive parts seen near at hand . . . New developments in plaster molding giving impetus to that process in aluminum, bronze casting

A COMPREHENSIVE and able discussion of precision casting methods by Gosta Vennerholm of the Ford Motor Co. foundry staff drew a large audience at the Society of Automotive Engineers' annual meeting here last month. The convention, incidentally, was one of the best attended in SAE history, despite the fact the program itself was run-of-mine in character, and few of the papers delivered presented anything particularly new or provocative. Still, an estimated 5000 thronged the Book-Cadillac hotel for technical sessions, committee meetings and exhibits. At the annual dinner, it required four large dining rooms in Masonic Temple to accommodate a crowd in excess of 2800, and 1400 tender chickens went to the roasting ovens to fill the diners' plates.

To return to Mr. Vennerholm's contribution, he reviewed the essential features of die casting, permanent mold casting, investment molding or, as he suggested it might be called more properly, slip molding, plaster molding and combinations of two or more of the preceding. Particular attention was paid to slip molding, Ford even before the war having done considerable work in applying this method to the production of high-speed tools of complicated shapes, notably milling cutters.

The first consideration when using the investment method is the wax model and the wax itself. Selection is based primarily on the shrinkage of the wax and its stability. A typical combination found to be satisfactory contains 31.33 per cent each of blue bulk, Superlo and Cincera waxes. To make the model or pattern, carefully machined and polished steel dies are used, into which the wax is injected by means of a gun while the die halves are held together under pressure. Common practice is to join together several wax models to form a cluster, and the assembled details are sprayed with a siliceous coating and placed into a flask into which the investment is cast.

Numerous investment compositions have been tried by Ford, the successful ones for high-temperature work being basically silica, silica base binder, alcohol and water. A typical composition is: 67 per cent silica, 33 per cent liquid made up of eight volumes of silica base binder, one volume of water and two volumes of alcohol. After the time necessary to cure the investment material, the mold is burned by placing it in a cold furnace, heating at a rate of 300-400 F per hour to 1400-1500° and holding for two to three hours to burn out all wax and dry to remove gas forming constituents.

The mold is removed from the firing furnace while hot and clamped on top of a specially designed melting furnace. Metal to be cast is melted in an indirect electric arc furnace in the necessary quantity to fill a single mold. In operation the furnace is raised to a temperature of about 3000 F while empty, after which the charge is introduced through the arc.

Principal advantage of the investment molding method, as Mr. Vennerholm sees it, is that it permits the casting of practically any alloy regardless of melting temperature into almost any shape, with size the only limitation. A major disadvantage is the high cost of the raw materials used, plus the considerable time element required for curing and burning the investment. So far it has not been found practical to salvage the molding materials but work is progressing in this direction, and the ideal conditions seem near enough to realization to justify a prediction that the use of investment casting methods for engine parts, gears and some chassis parts will soon be at hand.

New developments in techniques of casting and compositions of plaster mixes have given a spurt to plaster molding as an economical production process for aluminum and bronze, according to Mr. Vennerholm. As an example of a plaster mix which can be held to a minimum controlled shrink, he cited a typical analysis for casting aluminum: 30 parts by weight of gypsum, 10 parts of talc, 2 parts of accelerator and 60 parts water.

Essential steps in the plaster process include careful timing and manipulation from the time the dry ingredients are mixed until the mold is taken from the calcining furnace. Time of dry mixing, wet mixing, curing time until the pattern is withdrawn and time and temperature of calcining are dependent upon the size and shape of the plaster mold; they must be determined separately for each casting to be made.

In this connection, two embryonic developments have particular significance in the automotive field: First, there are several plasters on the market which are basically gypsum to which has been added a plastic material, giving a plaster which when cast is very hard and durable, suffering small dimensional changes. These materials are useful in making temporary tools to be used in plaster casting and also as molds for certain types of low melting point alloy castings. Extensive use is being found for them in pattern shops and body styling. Some of these relatively soft alloys are even suitable for trial runs of steel stampings, the advantage of course being that changes can be made readily before an expensive set of production cast iron and steel dies is necessary.

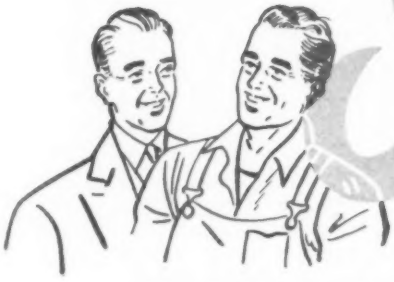
Secondly, another group of materials has been developed which, while not plaster, serve as flexible pattern materials. There are two principal types—castable flexible plastics and castable alginates. In each the purpose is to produce a pattern by casting which is sufficiently stable to permit plaster being cast around it and yet flexible enough so that the pattern may be withdrawn when the plaster has set. Obviously, with such a material a part may be molded without regard to draft, but in the present state of development, the latter materials, Mr. Vennerholm maintains, leave much to be desired, particularly if thin sections are to be cast.

* * *

AUTOMOTIVE and foundry metallurgists assembled at one of the SAE sessions to hear F. G. Tatnall of Baldwin Locomotive Works analyze the relationship between metallurgy, engineering and materials specifications. They got a kick out of one of his side remarks: "Metallurgists are not as dumb as they look—they couldn't be!" But they were more directly interested in his observations on damping capacity and notch sensitivity in iron and steel. Cast iron, of course, has long been a favored material in many applications because of its high damping capacity. Mr. Tatnall noted high damping materials of this type are on the low end of the notch brittleness scale because stress concentrations do not "knot up" too tightly at the roots of notches, and such materials do not resonate so easily under vibratory conditions, so that lower fatigue endurance limits can be tolerated.

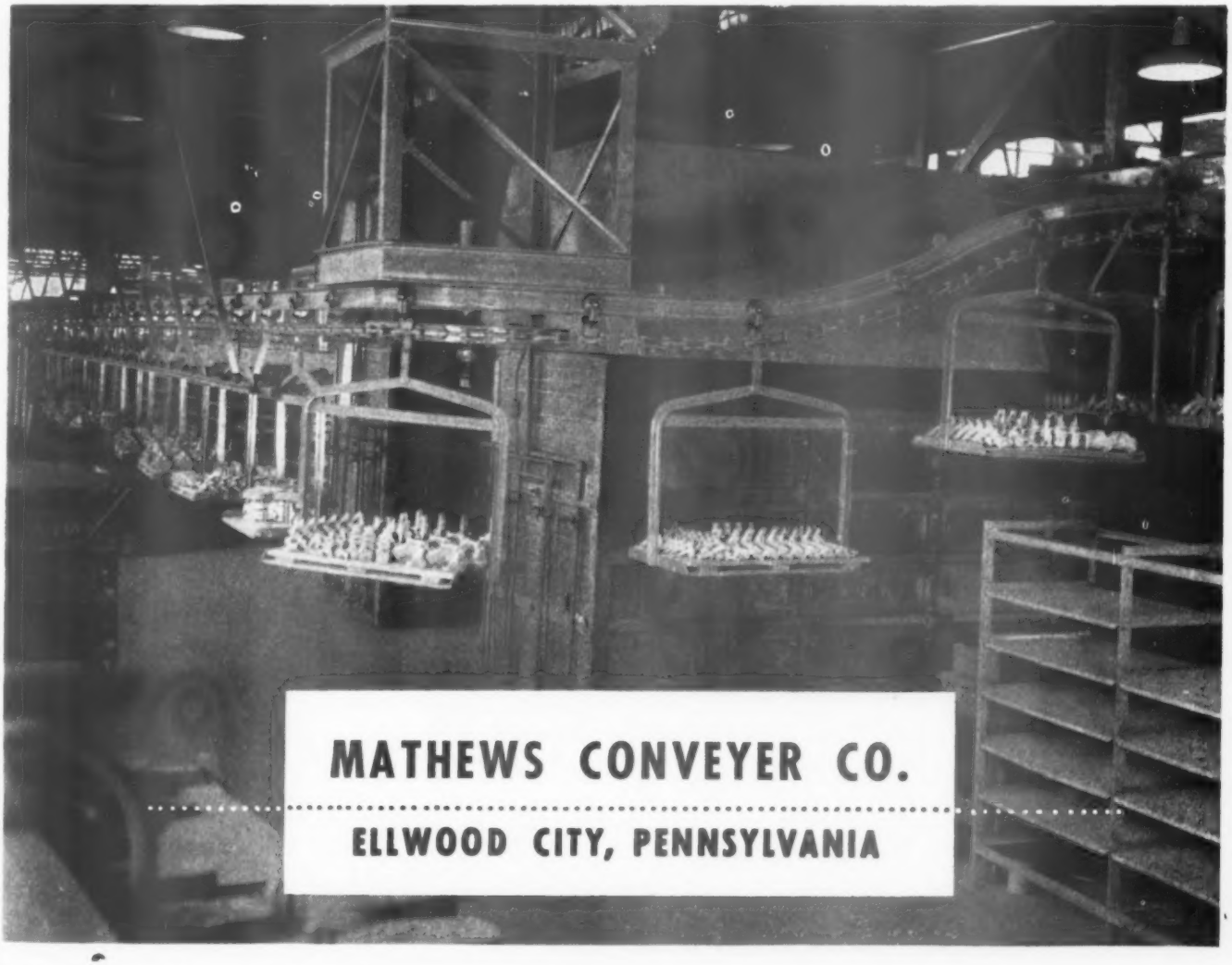
(*Concluded on page* 116)

Handling Problems Deserve SPECIAL Attention



EVERY manufacturer, in striving to keep costs at a minimum, must deal with more or less difficult material handling problems. These are not always quickly solved, and usually require considerable thought by plant and conveyer engineers. Most experienced plant engineers agree that the use of Mathews methods and Mathews equipment means efficient material handling. That is why Mathews Engineers are usually called in on the problem requiring special attention. There are many types of Mathews Conveyers of both gravity and power designs, and from these types are selected the units which make up Mathews continuous flow conveyer systems. It is with such systems that prominent manufacturers are reducing worker fatigue and keeping materials moving through processing machinery, storage and shipping, with a minimum of product re-handling, costly confusion and delay.

It might be that a Mathews Engineer can show you what others in your industry have done to improve their material handling. We will welcome your inquiry and give it prompt and thorough service.



(*Concluded from page* 114)

He added that some metallurgists and stress analysts say this vibration-absorbing capacity combined with ability to moderate stress concentrations is due to the multiplicity of internal stresses already existing in these materials counteracting each other. Actually, there is little data on this question of damping capacity and notch sensitivity of cast iron, particularly at high and low temperatures, and there is much conjecture as a result. An interesting research program could be set up to investigate and evaluate these characteristics, and it might lead to a clearer picture of the overall engineering properties of cast iron.

Incidentally, Mr. Tatnall concluded by saying, ". . . Personal judgment has not yet been accepted as an ingredient in a specification, since no tests and specifications have been established to rate human judgment. We all agree that this would be the most important thing to have anywhere along the line and would establish the real relation between metallurgy, engineering and materials specifications, but people have not yet come to trust fully the judgment of other people and so we must have specifications and tests and instrumentation and checks and balances."

• • •

TWO of the General Motors foundry expansion programs—Cadillac and Pontiac—continue unfinished and lagging far behind original schedules. The Cadillac foundry modernization, now a little better than 80 per cent complete, was started a year ago last summer. Interrupted, of course, by the General Motors strike, the program should be wound up by spring. One of the most spectacular installations is a 600-foot overhead gas-fired normalizing or "controlled cooling" furnace through which blocks pass on hooks from a chain conveyor after coming from the shakeout station. A slot in the top of the furnace accommodates the conveyor hooks. Temperature is held around 1100 F with the idea of preventing the hot V-8 blocks from cooling too rapidly and cracking in the heavy center section.

As it looks now, the Pontiac program will not be finished perhaps until summer. Two out of six new cupolas have been erected and are operating but a shortage of starters for blower motors is holding up other units. With both Pontiac and Olds assemblies booming along at a pace of close to 1000 cars per day, except for a two-week interruption to permit inventory and a changeover to 1947 models, the Pontiac foundry is hard pressed to keep up with demand for motor blocks and other gray iron castings for these divisions, as well as supplying a portion of General Motors Truck requirements.

• • •

ON March 13 the final decision will be made as to whether to proceed with manufacture of the Chevrolet light car, tabled last summer when it appeared materials were too critical to justify going ahead with the program. Chances are about 10 to 1 in favor of the project being reactivated, which would mean equipment deliveries starting about in October and production some time in the spring of 1948. Engineering development on the "Chevrolight" has been continued, despite the holdup on manufacturing plans. The car will be new from the wheels up, and will involve numerous radical departures in manufacturing methods particularly. Production will be centered in two new plants in the Cleveland area. Foundry requirements probably will be handled by Chevrolet Gray Iron at Saginaw, where a 50 per cent expansion program has been mapped out.

Ford, too, has reopened plans for a low-price car which were laid away last August. Scheduled for introduction in 1948, the model is said to represent the greatest change in the Ford car since the introduction of the model A. This is not surprising in view of the fairly complete turnover in Ford executive, engineering, styling and production personnel during the last two years.

Colorado Founders Want AFA Chapter

Colorado foundrymen have petitioned directors of the American Foundrymen's Association for a Rocky Mountain chapter with headquarters in Denver. Signed by 71 foundrymen representing 35 companies, the petition developed at a meeting of state-wide leaders of the industry in Denver, Dec. 3. Membership in the chapter, the petitioners state, would be open to all foundrymen and representatives of allied trades in Colorado, Utah, southeastern Wyoming, southwestern Nebraska and western Kansas.

J. L. Higson, superintendent, Western Foundry, Denver, is serving as chairman during the organization period, with Pearson M. Payne, Rotary Steel Castings Co., as temporary secretary. Charles E. Stull, president, Manufacturers Foundry Corp., is also active in organizational work.

W. R. Manske, works manager, American Manganese Steel Division, American Brake Shoe Co., heads the group's by-laws committee and E. B. Zabriskie, Magnus Metal Division, National Lead Co., is nominating committee chairman.

PHILADELPHIA CHAPTER: Entertainment committee of the Philadelphia Chapter of the AFA, is shown here at the Chapter's annual Christmas party. Back row, left to right, are: John Robb, Hickman, Williams Co.; S. Kirn, M. L. Kirn & Brother; H. Mendell, Pennsylvania Foundry Supply Co. Front row, left to right, are: W. W. Thawley, Nonferrous Foundry Co.; L. Lane, Florence Pipe Foundry & Machine Co.; B. A. Miller, Baldwin Co., chapter chairman; W. Gallano, E. J. Lavino Co., committee chairman; L. Dill, George F. Pettinos Co., and H. V. Witherington, H. W. Butterworth & Sons Co.

Veeder-Root Inc., Hartford, Conn., held a four-day "open house" beginning Dec. 14, for employees, customers and the general public at its new three-story plant addition. Company manufactures counting and computing devices and hinges, and during the "open house" exhibited more than 70 different products into which its counters are built.

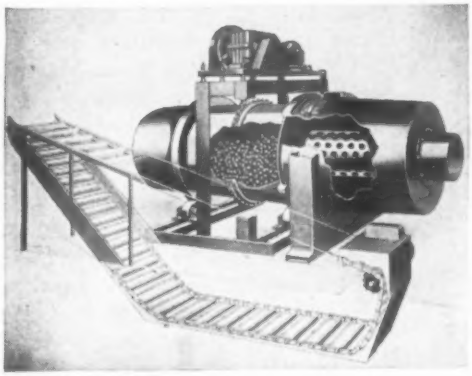
RANSOHOFF WET CLEANING MILLS

AUTOMATIC-STAR RETURN
SAVE 30% TO 70% ON YOUR CLEANING COSTS

FOR EVERY FOUNDRY CLEANING PURPOSE

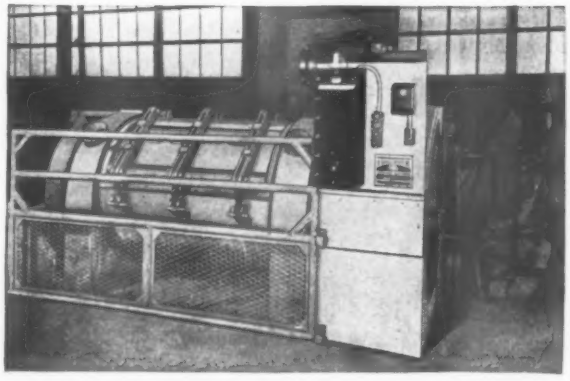
CUT COSTS . . . IMPROVE WORKING CONDITIONS

gentle . . . easy . . . economical . . . not self-destructive . . . no dust



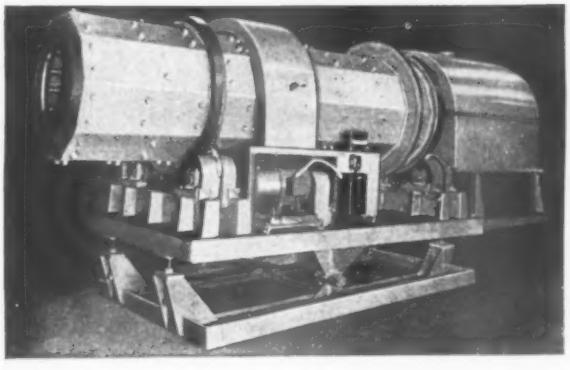
END-LOADING, END-UNLOADING MILL

Power loader or conveyor belt can be installed for ease in loading. Mill and belt may be controlled by installation of time switches.



SIDE-LOADING, SIDE-UNLOADING MILL

This mill is cleaning motorend brackets. Cleaning time is CUT 65% over former methods. Several old-style units were eliminated.



CONTINUOUS END-LOADING, END-UNLOADING MILL

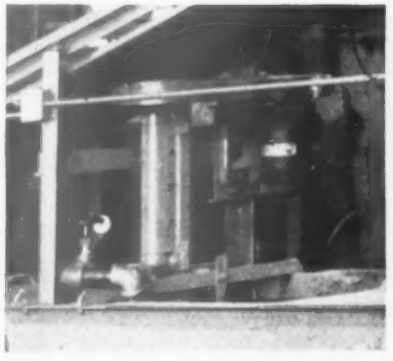
for preliminary cleaning. Slope is adjustable to regulate flow of work. Equipped with RANSOHOFF COMPOSITE LINER.

RANSOHOFF SETTLING TANK

Tumbling solution flows from mill into sand conveyor tank. Heavy sand settles to bottom, and is removed continuously by sand conveyor. Solution is pumped into verticle settling tank, loam settles to bottom and clean solution is returned to the mill.

Ask the RANSOHOFF ENGINEERS

How To Save Costs in YOUR Foundry



RANSOHOFF *PACKLESS* VERTICAL CENTRIFUGAL PUMP

Mounted inside conveyor. No stuffing boxes required. Rugged, large diameter, slow moving impeller. Driven by V-belt.

N. Ransohoff, Inc.

TOWNSHIP RD. & BIG 4 RR. CINCINNATI 16, OHIO

WATCH FOR THE BIG NEWS! A new labor-saving continuous wet mill will be announced soon.

Foundry Developments

By EDWIN BREMER

RECENT reports indicate that a southern foundry after a long period of development work has brought to a practical commercial stage the application of a new type of binding agent in molding and core sands for production of gray iron castings. First mention of the work was presented in THE FOUNDRY a little over a year ago, and while details on the binder and procedure still are under wraps, the former appears to be one of the numerous plastics or synthetic resins. In the case of molding sand no water is used, and adhesive or bond property is developed under pressure. In the case of cores the resin is spread by means of a solvent which is recovered during drying or baking and used again. Only a small part of the resin burns out of the molding sand during pouring, and the sand is reused with an addition of about 0.25 per cent resin. Process is said to have numerous advantages, including smooth peeling from castings.

° ° °

NEW MAGNESIUM alloy consumer product recently placed on the market is one of the first offerings of a newly established firm in Bay City, Mich.—Saginaw Bay Industries Inc. Utilizing the lightness and thermal and surface qualities of the metal are cast magnesium alloy individual steak platters designed for serving at the table as well as for broiling and frying. Their silvery matte finish is cleaned easily. They eliminate separate serving dishes and keep the steak hot because of their massive yet lightweight construction. The platters also are recommended for other meats, eggs and fish.

° ° °

STANDING committee in charge of reviewing and revising Simplified Practice Recommendation R184-42, Iron Body Valves, has approved a revision of the recommendation, and mimeographed copies may be secured from the Division of Simplified Practice, National Bureau of Standards, Washington 25. Proposed revision applies to the usual type of iron gate, globe, angle and check valves for primary pressures of 25, 125, 150 and 250 lb, and 100 and 800 lb pressures for water, oil and gas. A simplified range of sizes is given for the various types and kinds of valves for each of the pressure ratings. General adoption of the revision as a standard of practice should result in economies to all concerned in the production, distribution and use of these valves.

° ° °

EVERY NOW and then with reference to specifications someone wants to know: "What is the difference in service in a material of say 59,950 psi which is rejected and the 60,000 psi minimum limit which is accepted?" As an answer Francis G. Tatnall, manager of testing research, Baldwin Locomotive Works, in a paper presented at the recent SAE annual meeting gave the following: "The material presented for test will not be used in the condition presented or in the form tested when in service so the specification test is no measure of fitness of the material for service, merely a screening value; and second, personal judgment has not yet been accepted as an ingredient in a specification, since no tests and specifications have been established to rate human judgment. We all agree that this would be the most important thing to have anywhere along the line and would establish the real relation between metallurgy, engineering and materials specifications, but people have not yet come to fully trust the judgment of other people and so we must have specifications, and tests and instrumentation and checks and balances."

° ° °

CROSS-SECTIONAL survey of the German steel castings industry which played a major role in meeting military requirements of the Third Reich during the war is presented in a publication *The German Steel Castings Industry* recently made available by the Bureau of Mines, Washington 25. Prepared by Charles W. Briggs, research director, Steel Founders' Society of America, Cleveland, and Max T. Ganzauge, General Railway Signal Co., Rochester, N. Y., the publication discusses raw materials, steel melting and molding practices, tapping and pouring methods, heat treatment, welding, inspection and testing, and production of centrifugal castings. In addition the 105-page circular includes appendixes on inspection requirements of steel castings for aircraft; composition, heat treatment and properties of various classifications of cast steels; beryllium in steel castings; effect of various heat treatments upon cast-armor steel, and specifications for heat-resistant steel castings. A copy of Information Circular 7362, *The German Steel Castings Industry*, may be obtained by writing to the Bureau of Mines.

° ° °

GLYCERINE has many uses in the treatment of aluminum and its alloys according to *Glycerine Facts* published by the Glycerine Producers' Association, New York. One of the latest is a method for removing oxide film on aluminum surfaces and as described in U. S. Patent No. 2,399,134 it is said to possess advantages over other processes. Solutions are prepared by passing anhydrous hydrogen fluoride into a liquid alcoholic fluid such as glycerine until a 5 to 40 per cent concentration is obtained. A basic formula is given as: Water 1 to 5 per cent, hydrogen fluoride 5 to 40 per cent, and glycerine to make 100 per cent. Article from which the oxide is to be removed may be immersed in the solution for a suitable period of time, or the solution may be applied to a given area of the metal. Cleaned surface is washed with water. Treatment time will depend on type of coating, hydrogen fluoride content of solution and temperature. Treatment is useful in metallurgical analysis for removing films formed during electrolytic brightening, for cleaning prior to joining operations, and for removing aluminum oxide previous to a subsequent coating process.

° ° °

APPLICATION of rust-resistant coatings to iron and steel by immersion in an acid phosphate bath is described in a 113-page handbook now on sale by the Office of Technical Services, Department of Commerce, Washington 25. Written by Lloyd O. Gilbert, Rock Island Laboratory, U. S. Ordnance Department, the report entitled "Phosphating" PB-32864 is available as photostats for $8. and as microfilm for $3. Successful application of rust-resistant coatings according to the handbook depends on accurate control of phosphating solution, thorough cleaning and preparation of the metal surfaces and use of properly designed equipment. Directions must be followed carefully. Processes described use commercial phosphating solutions. One coating used is designed for high corrosion resistance while the other is more resistant to heat, pressure and abrasion.

538 INGOTS CAST IN ONE GRAPHITE MOLD!

Using a single "National" graphite mold, a steel company has smashed all records by casting a total of 538 steel ingots. This was accomplished without any process changes, without the use of mold wash, and without treatment of any sort.

In addition to cutting mold costs 77.4%, graphite provided these benefits: Elimination of stickers...better surface condition—less cold lapping ... improved grain structure. Many other advantages in pouring and stripping were obtained.

Every foundryman will want the complete story of this interesting experience with graphite molds. Address National Carbon Company, Inc., Dept. FA.

The graphite mold in which 538 ingots were cast

ADVANTAGES OF GRAPHITE FOR MOLDS:

Will not deform—at any temperature.
No stickers—stripping 30% faster.
Not wet by molten metals.
Heat conductivity 2-3 times that of cast iron.
More uniform cooling.
No mold wash needed—fewer inclusions.

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PRECISION *Built*

* **Permanent Alignment and Rigidity**
* **Equalized Squeeze**
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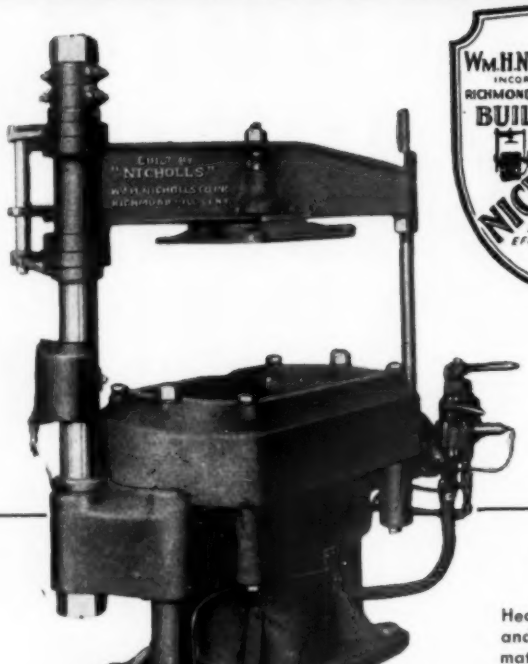

Wm. H. Nicholls Co. Incorporated Richmond Hill 1, N.Y. Built by Nicholls The Sign of Efficiency

11-32 Type "D"

Heavy Duty Combination Jolt and Power Squeezer with Pneumatic Pattern Draw and Equipped with Parallel Squeeze Head.

IMPROVED HEAVY DUTY MOLDING MACHINES

This NICHOLLS Molding Machine is equipped more thoroughly than ever before to assure you steady production rate and low initial operating and maintaining costs. It is the product of thirty six years of improvement and research.

Pistons and Cylinders are finished ground to micrometer sizes. All draw pins and guide bushings are case hardened and ground to precision tolerances for perfect fit and smooth operation.

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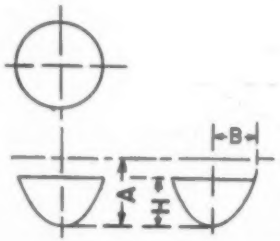
NICHOLLS

FORMULAS FOR DETERMINING THE WEIGHTS OF CASTINGS

(Continued from January)



To find the weight of a segment of an ellipsoid, when the base is parallel to the revolving axis, multiply the difference between three times the fixed semiaxis and the height of the segment, by the square of the height, by the square of the revolving semiaxis, by the value of M (Table XI) and divide by the square of the fixed semiaxis.

$$W = \frac{(3A - H)H^2B^2M}{A^2}$$

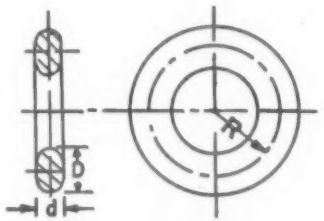
Table XII

Wt. per cu. in.	K	M	N	Wt. per cu. in.	K	M	N	Wt. per cu. in.	K	M	N
.096	.474	1.895	.603	.250	1.234	4.935	1.571	.410	2.023	8.093	2.576
.100	.494	1.974	.628	.260	1.283	5.132	1.634	.420	2.073	8.291	2.639
.110	.543	2.171	.691	.270	1.332	5.330	1.696	.430	2.122	8.488	2.702
.120	.592	2.369	.754	.280	1.382	5.527	1.759	.440	2.171	8.685	2.765
.130	.642	2.566	.817	.290	1.431	5.724	1.822	.450	2.221	8.883	2.827
.140	.691	2.764	.880	.300	1.481	5.922	1.885	.460	2.270	9.080	2.890
.150	.740	2.961	.942	.310	1.530	6.119	1.948	.470	2.319	9.277	2.953
.160	.790	3.158	1.005	.320	1.579	6.317	2.011	.480	2.369	9.475	3.016
.170	.839	3.356	1.068	.330	1.629	6.514	2.073	.490	2.418	9.672	3.079
.180	.888	3.553	1.181	.340	1.678	6.711	2.136	.500	2.468	9.870	3.142
.190	.938	3.751	1.194	.350	1.727	6.909	2.199	.510	2.517	10.067	3.204
.200	.987	3.948	1.257	.360	1.777	7.106	2.262	.520	2.566	10.264	3.267
.210	1.036	4.145	1.319	.370	1.826	7.304	2.325	.530	2.616	10.462	3.330
.220	1.086	4.343	1.382	.380	1.875	7.501	2.388	.540	2.665	10.659	3.393
.230	1.135	4.540	1.445	.390	1.925	7.698	2.450	.550	2.714	10.857	3.456
.240	1.184	4.737	1.508	.400	1.974	7.896	2.513	.560	2.764	11.054	3.519

Interpolation Table

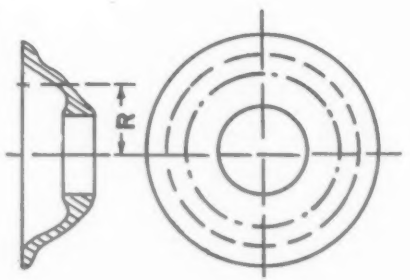
Add'l. Wt.	Add'l. K	Add'l. M	Add'l. N	Add'l. Wt.	Add'l. K	Add'l. M	Add'l. N	Add'l. Wt.	Add'l. K	Add'l. M	Add'l. N
.001	.005	.020	.007	.004	.020	.079	.025	.007	.035	.130	.044
.002	.010	.039	.013	.005	.025	.099	.031	.008	.039	.158	.050
.003	.015	.059	.019	.006	.030	.113	.033	.009	.044	.178	.057

For method of interpolation see Table II.



To find the weight of a ring of elliptical cross-section, multiply the radius of the circle passing through the center of the cross-section by the large diameter of the ellipse, by the small diameter, by the value of the constant K, (Table XII) corresponding to the weight per cubic inch of material used.

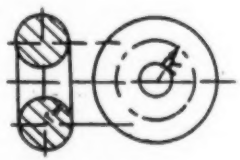
$$W = RDdK$$



To find the weight of a solid generated by revolving a plane area about an axis, multiply the area by the distance from the center of gravity of cross-section to the axis by the value of N (Table XII).

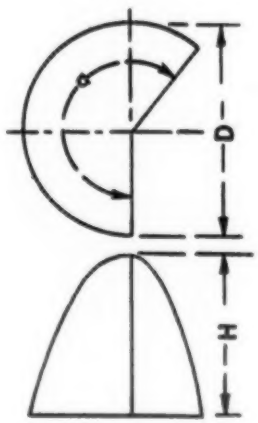
$$W = ARN$$

FORMULAS FOR DETERMINING THE WEIGHTS OF CASTINGS



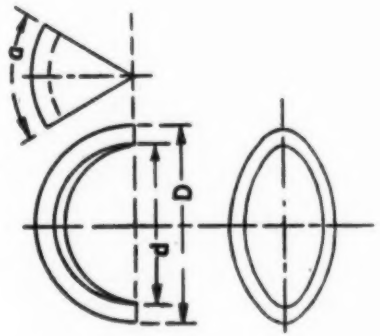
To find the weight of a ring of circular cross-section, multiply the radius of the cross-section squared by the radius of the circle passing through the center of the cross-section, by the value of M (Table XII).

$$W = r^2RM$$



To find the weight of a sector of a paraboloid, mutiply the diameter of the base squared by the height, by the number of degrees in the angle by the value of K (see Table XIII) corresponding to the weight per cubic inch of material used.

$$W = D^2HaK$$



To find the weight of a spherical wedge, multiply the diameter of the sphere cubed by the number of degrees in the angle by the value of M (Table XIII).

$$W = D^3aM$$

Table XIII

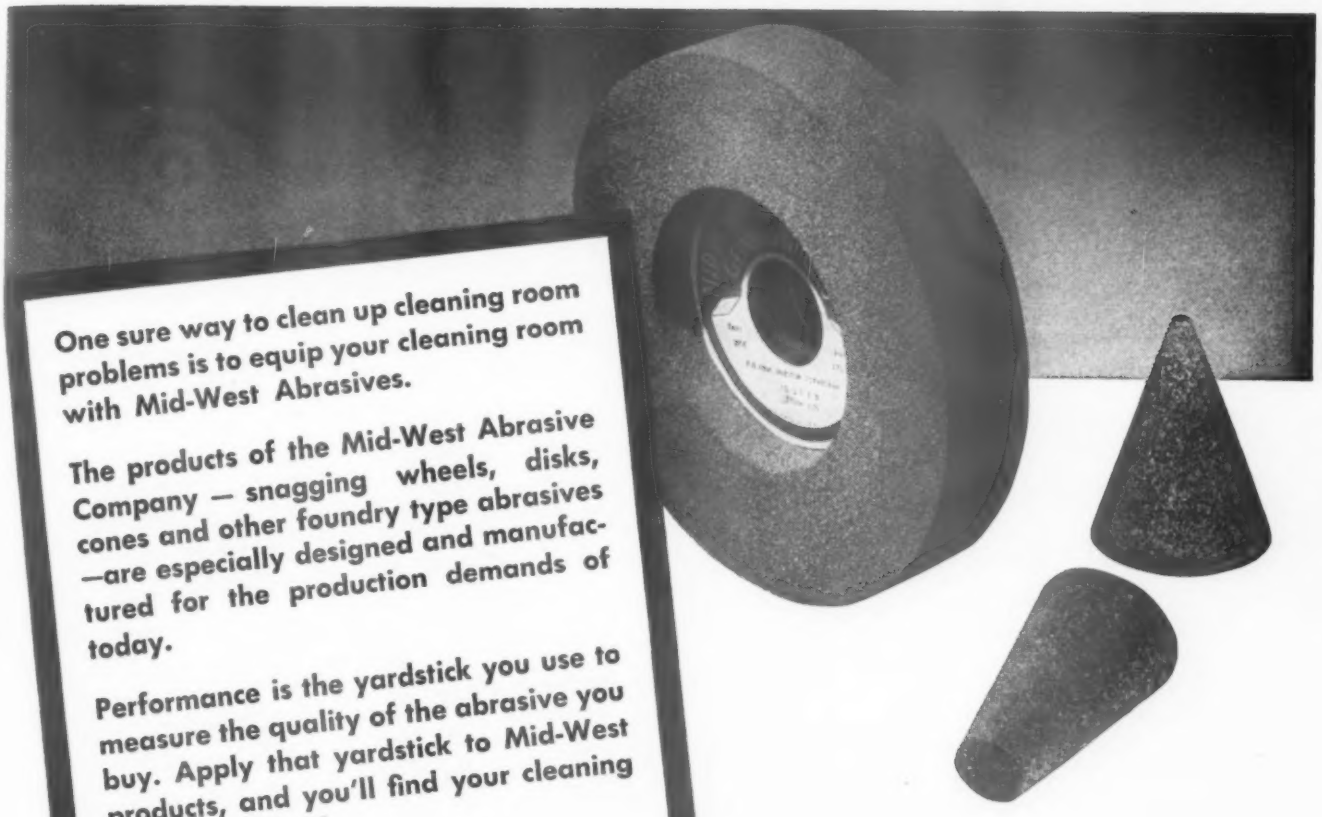
Wt. per cu. in.	K	M	Wt. per cu. in.	K	M	Wt. per cu. in.	K	M	Wt. per cu. in.	K	M
.096	.000105	.000140	.210	.000229	.000305	.330	.000360	.000480	.450	.000491	.000654
.100	.000109	.000145	.220	.000240	.000319	.340	.000371	.000495	.460	.000501	.000669
.110	.000120	.000160	.230	.000251	.000334	.350	.000382	.000509	.470	.000512	.000684
.120	.000131	.000174	.240	.000262	.000349	.360	.000393	.000524	.480	.000523	.000698
.130	.000142	.000189	.250	.000273	.000363	.370	.000403	.000538	.490	.000534	.000712
.140	.000153	.000203	.260	.000283	.000378	.380	.000414	.000553	.500	.000545	.000727
.150	.000164	.000218	.270	.000294	.000393	.390	.000425	.000567	.510	.000556	.000741
.160	.000174	.000233	.280	.000305	.000407	.400	.000436	.000582	.520	.000567	.000756
.170	.000185	.000247	.290	.000316	.000421	.410	.000447	.000596	.530	.000578	.000770
.180	.000196	.000261	.300	.000327	.000436	.420	.000458	.000611	.540	.000589	.000785
.190	.000207	.000276	.310	.000338	.000450	.430	.000469	.000625	.550	.000600	.000800
.200	.000218	.000291	.320	.000349	.000465	.440	.000480	.000640	.560	.000611	.000815

Interpolation Table

Add'l. Wt.	Add'l. K	Add'l. M	Add'l. Wt.	Add'l. K	Add'l. M	Add'l. Wt.	Add'l. K	Add'l. M
.001	.000001	.000001	.004	.000004	.000006	.007	.000008	.000010
.002	.000002	.000003	.005	.000005	.000007	.008	.000009	.000012
.003	.000003	.000004	.006	.000007	.000009	.009	.000010	.000013

For method of interpolation see Table II.

(To Be Concluded)



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The products of the Mid-West Abrasive Company — snagging wheels, disks, cones and other foundry type abrasives —are especially designed and manufactured for the production demands of today.

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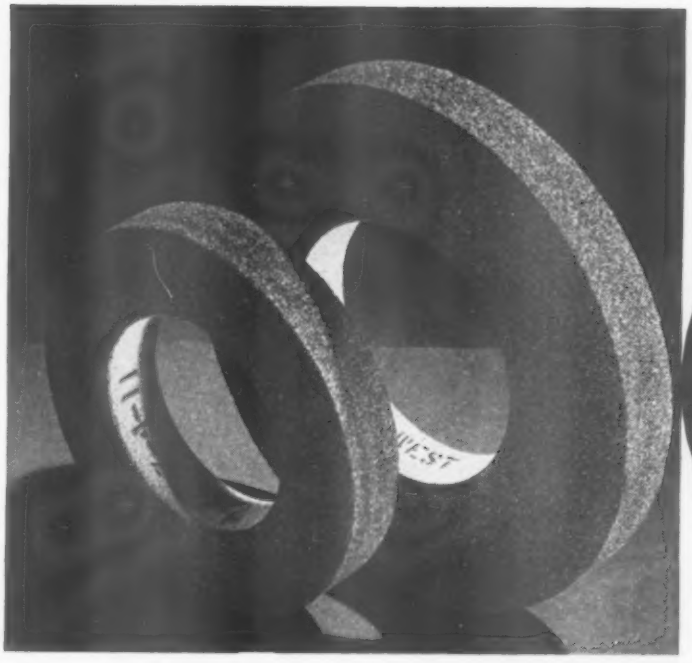

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Manufacturers of DEPENDABLE Abrasives

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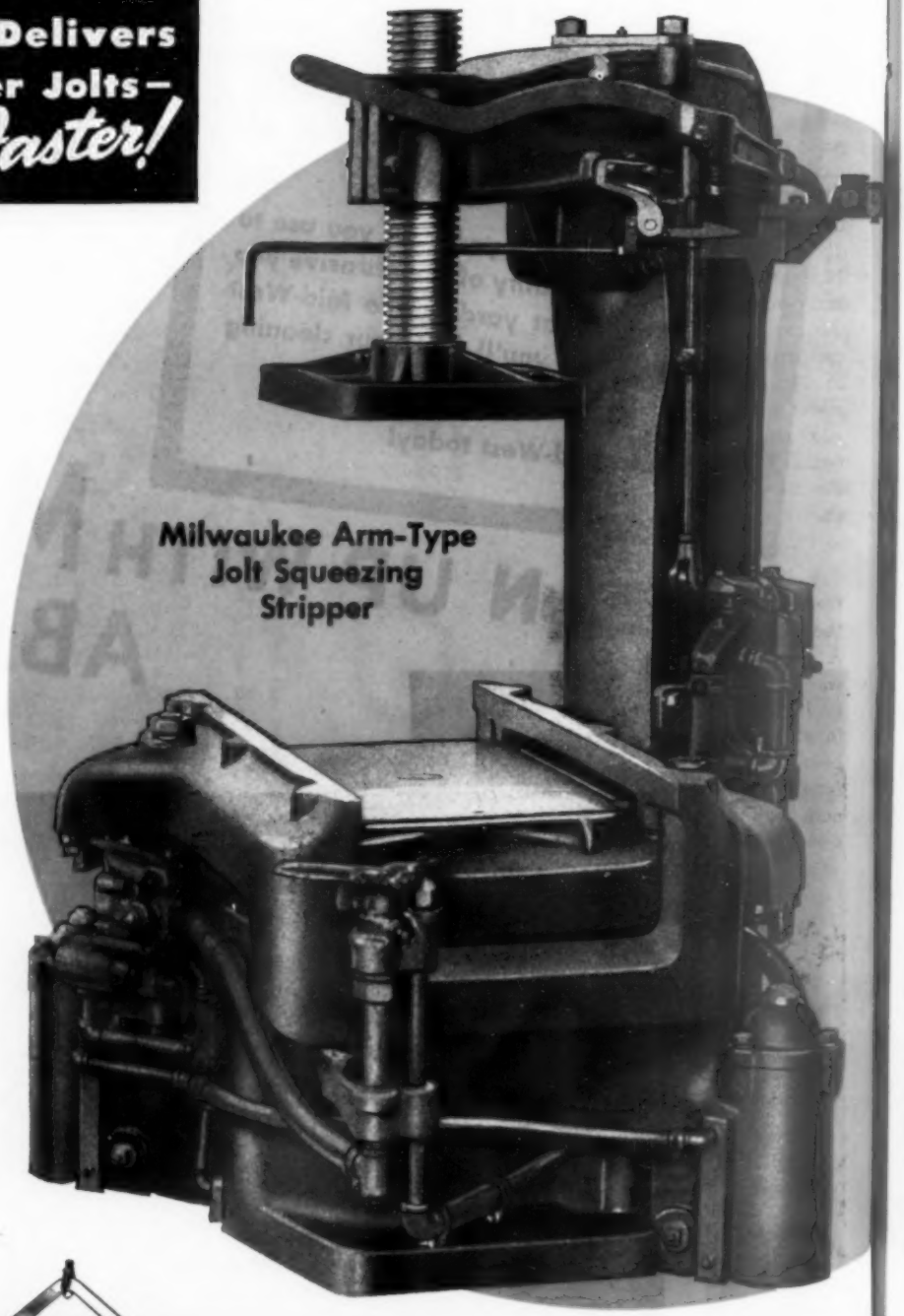
Here's a Stripper that Delivers Uniform Molds with Fewer Jolts— *Faster!*

The Milwaukee Jolt Squeeze Stripper enables you to speed up mold production. Every blow struck by the massive jolt table is a true packing blow. Because anvil is located directly under jolt table, piston wear cannot affect jolting efficiency. Big capacity poppet valve allows squeeze piston to move up at high speed for maximum impact against squeeze head. Squeeze is always parallel. Two machined bearings on squeeze arm square up against two matching surfaces on back frame. Cast steel frame and arm are big and heavy, designed to take heaviest impacts.



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EASY TO OPERATE . . . DESIGNED FOR SAFETY

Control levers are placed right for fast operation. Pattern draw is fully automatic. Moving squeeze arm is easy because arm rides on roller bearings. All working adjustments can be made by operator, without aid of a mechanic. Location of squeeze arm lever keeps operator's hands in safe zone above flask line. Safety latch locks squeeze head until platen is in correct squeezing position.

Get the complete story on the Milwaukee Jolt Squeezing Stripper. Write today for Bulletin No. 106.

MILWAUKEE *Foundry Equipment Co.*

3238 W. PIERCE STREET, MILWAUKEE 4, WISCONSIN, U.S.A.

OBITUARY

CARL O. THIEME, 50, vice president and works manager, H. Kramer & Co., Chicago, died Dec. 27. Associated with the company 25 years, he was widely known as a nonferrous metallurgist. In the fall of 1945, Mr. Thieme was one of six comprising a mission which, under sponsorship of the War Department, visited European and Mediterranean theaters of operations to make a survey on battlefield scrap and European smelting facilities. He was a member of the Chicago Chapter of the American Foundrymen's Association and other technical organizations.

• • •

Eugene A. Holmgreen, 82, president, Alamo Iron Works, San Antonio, Tex., died there Jan. 2. Mr. Holmgreen, active in business until the day of his death, became associated with the company in 1880, three years after his father, George Holmgreen, founded it. From a small iron works and general machine shop on the banks of the San Antonio River, the company expanded under the leadership of Mr. Holmgreen and formed branch plants in Houston, Corpus Christi, Brownsville, and San Angelo, Tex., and included pattern shops and foundries producing a wide variety of iron, brass, bronze and aluminum castings.

• • •

E. Kay Ford, 57, vice president, Hanna Furnace Corp., Detroit, died there Jan. 8, following a short illness. A native of Bellewood, Pa., Mr. Ford was graduated from Cornell University in 1910. He joined the furnace company in 1920 as a salesman and became vice president in charge of sales 9 years later. Mr. Ford took an active part in activities of American Iron and Steel Institute, and Detroit Foundrymen's Association which later became Detroit Chapter of the American Foundrymen's Association.

• • •

James S. Watson, 72, former vice president, Link-Belt Co., died Dec. 10, 1946, after a long illness. Born in Philadelphia, Mr. Watson joined the Link-Belt Co. in 1893 at the Philadelphia plant. In 1921 he was transferred to Indianapolis and became vice president and general manager of both Indianapolis plants in 1929. He retired from Link-Belt Co. in 1944 but was active in Indianapolis civic affairs until his death.

• • •

George O. Forbes, 72, since 1938, chairman of the board of directors, Gunite Foundries Corp., Rockford, Ill., died Dec. 8, at his home in North Egremont, Mass. Mr. Forbes was a grandson of Ducan Forbes, founder of Rockford Malleable Iron Works, which later became the Gunite corporation. Following his graduation from Princeton University, Mr. Forbes worked in various departments of the Gunite foundry. In 1901, upon the death of his father, he was made treasurer of the company.

• • •

JOHN HARSCH, 78, founder and for many years president of the John Harsch Bronze & Foundry Co., Cleveland, died Jan. 4 at his winter home, Gulfport, Miss. Entering the foundry at the age of 13 he served an apprenticeship at the plant of the Reedy Elevator Co., Chicago, and later, following the custom of the day, he worked as a journeyman molder in several foundries in various parts of the country. At 29 he became foreman of Winslow's foundry, Chicago, and 9 years later assumed

JOHN HARSCH

charge of the W. S. Tyler Co. foundry, Cleveland. Twelve years later, in 1918, he established his own foundry which gradually developed into one of the most important plants in the Middle West in the construction and fabrication of nonferrous castings and rolled and extruded products. On several occasions THE FOUNDRY has been privileged to present illustrated descriptions of artistic statuary and ornamental bronzes produced under the direction of this modern master foundryman, and his three sons, Raymond, Harry and Bert.

• • •

Sydney G. McAllister, 67, chairman of the executive committee and retired president, International Harvester Co., Chicago, died Dec. 25 in Pasadena, Calif. He joined the company in 1897 as an office boy, retiring as president in 1940.

• • •

Charles F. Bliss, 88, president of the Farrel Foundry & Machine Co., Ansonia, Conn., from 1912 until 1927, when it became the Farrel-Birmingham Co., and subsequently president of that company until his retirement in 1928, died recently at his home in New Haven, Conn. Until his retirement he had been associated with the Farrel organization for 50 years.

• • •

Albert I. Brost, 56, treasurer of the Brost Pattern & Casting Co., Cleveland, died at his home in Cleveland Heights Jan. 5 after an illness of several months. Mr. Brost served a patternmaking apprenticeship at the plant of the Kilby Mfg. Co., and worked at the trade for several years before joining his brothers Jay and Oliver in the Brost Pattern & Casting Co. He served as treasurer of the company in addition to his duties as pattern shop superintendent.

• • •

Milton Isay, 48, secretary and treasurer, Allegheny Foundry Co., Pittsburgh, died there Dec. 17. A native of Pittsburgh, Mr. Isay had been associated with the foundry company since 1925.

• • •

Wedworth V. Baker, president, Detroit Sheet Metal Works, Detroit, died Dec. 11, at his home in that city. Mr. Baker was a graduate of Michigan State College.

• • •

Frederick G. Adamson, 80, retired founder and treasurer, Stephens-Adamson Mfg. Co., Aurora, Ill., died Dec. 29, in Pasadena, Calif., his home for 19 years.

• • •

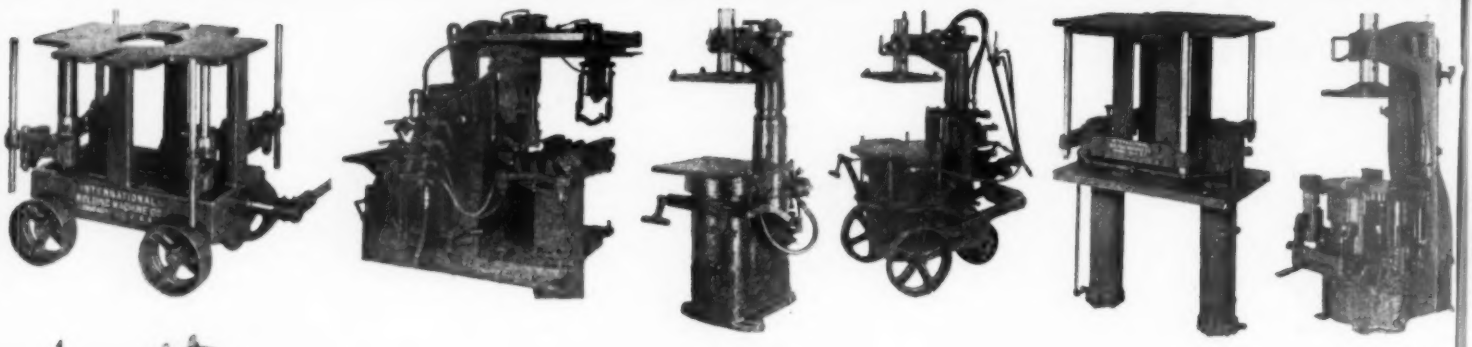
Joseph E. Wagner, 60, works manager of the Alliance, O., plant, American Steel Foundries, Chicago, died recently.

Work Injuries Are More Numerous

Volume of disabling work injuries in manufacturing increased with the increase in employment during the third quarter of 1946, according to a report of the Bureau of Labor Statistics, U. S. Department of Labor. The ratio of injuries to time lost, however, remained stable, indicating no general relaxation of safety standards.

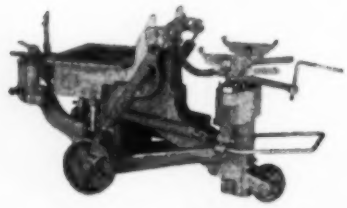
Approximately 128,800 manufacturing establishment employees had disabling work injuries during the period. This was 4800 more than in the second quarter and 21,300 above the first quarter.

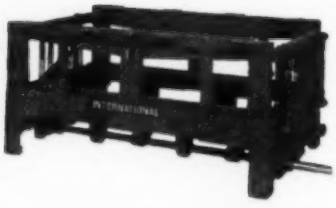
In iron foundries there were 48.1 disabling injuries for each million employee-hours worked in the third quarter and 47.1 for the Jan.-Sept. period. In steel foundries there were 37.2 in the third quarter and 36.1 to Sept. Nonferrous foundries were lowest with 25.5 and 26.7, respectively. This compares with the average for all manufacturing of 18.2 for the first quarter and 18.1 for the second and third quarters.

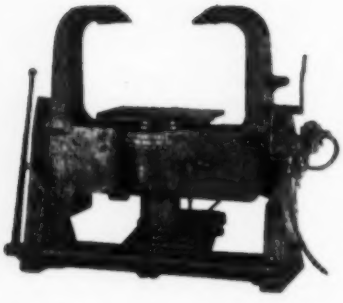


INTERNATIONAL MOLDING MACHINES

For Castings







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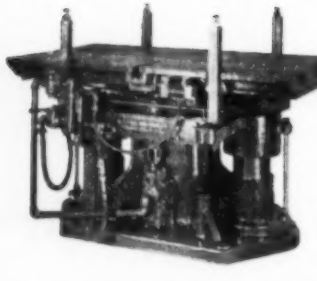
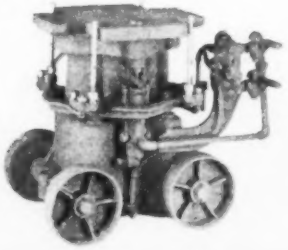
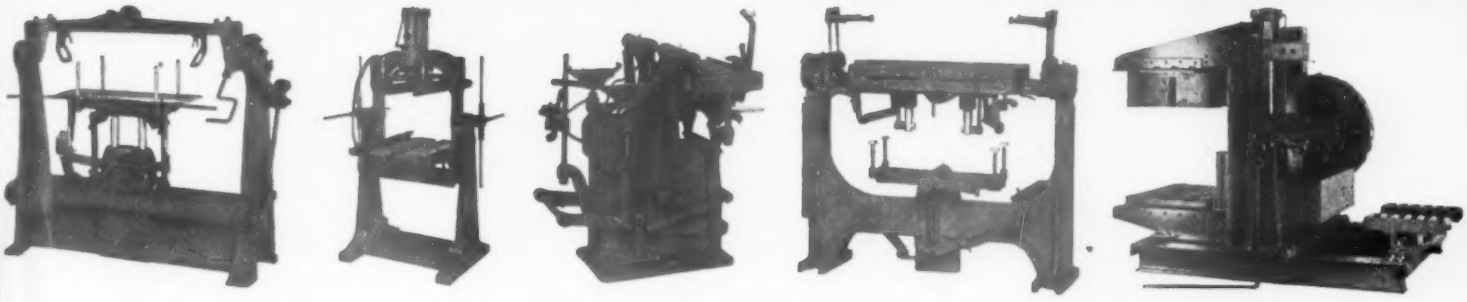
70 Standard Types - - - 900 Different Sizes

Many Special Designs to meet Special Requirements

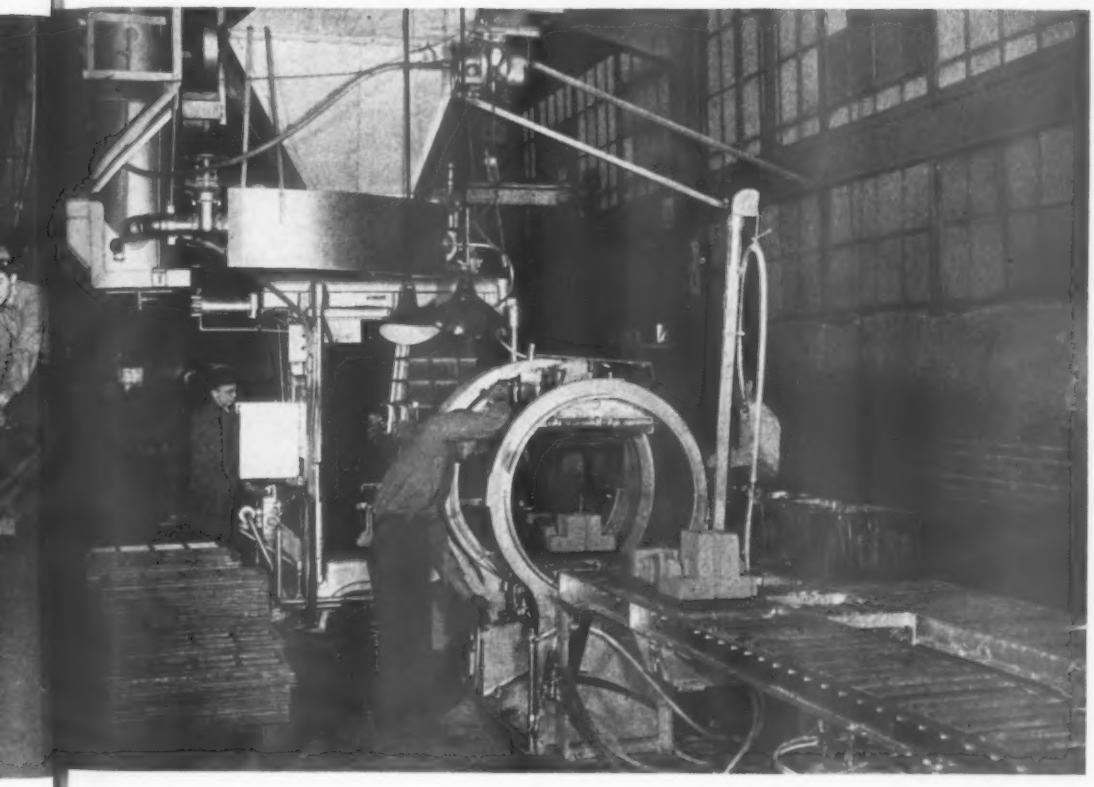


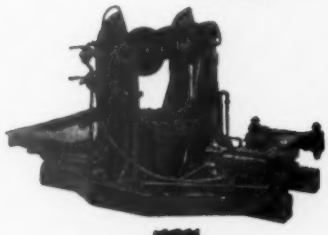


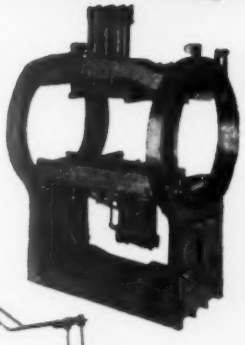


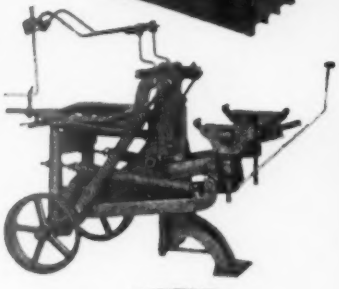
INTERNATIONAL MOLDING MACHINES

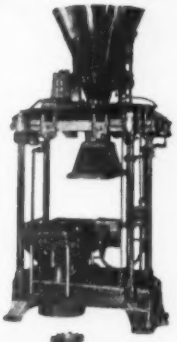
For Cores











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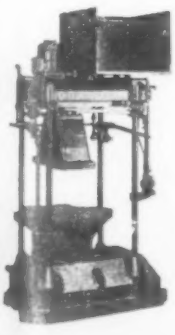
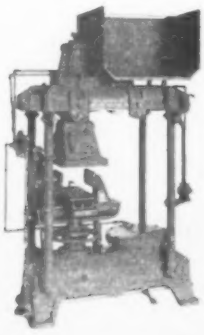
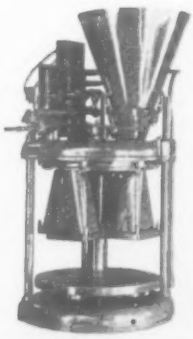
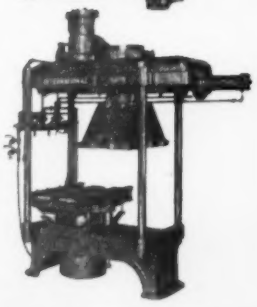








Above—Battery of melting furnaces in new brass foundry of Hays Mfg. Co., Albion, Pa.

Left—View of the cleaning and sorting department

Below—One of the molding machines with its two conveyor lines

New Brass Foundry

Makes Plumbing Fixtures

By WALTER RUDOLPH

APPROXIMATELY 50,000 lb of brass castings are being poured daily at the new Hays Mfg. Co. foundry in Albion, Pa. This plant supplants the firm's main foundry which has been producing an extensive line of plumbing fixtures for years in Erie, Pa., about 30 miles northeast of Albion.

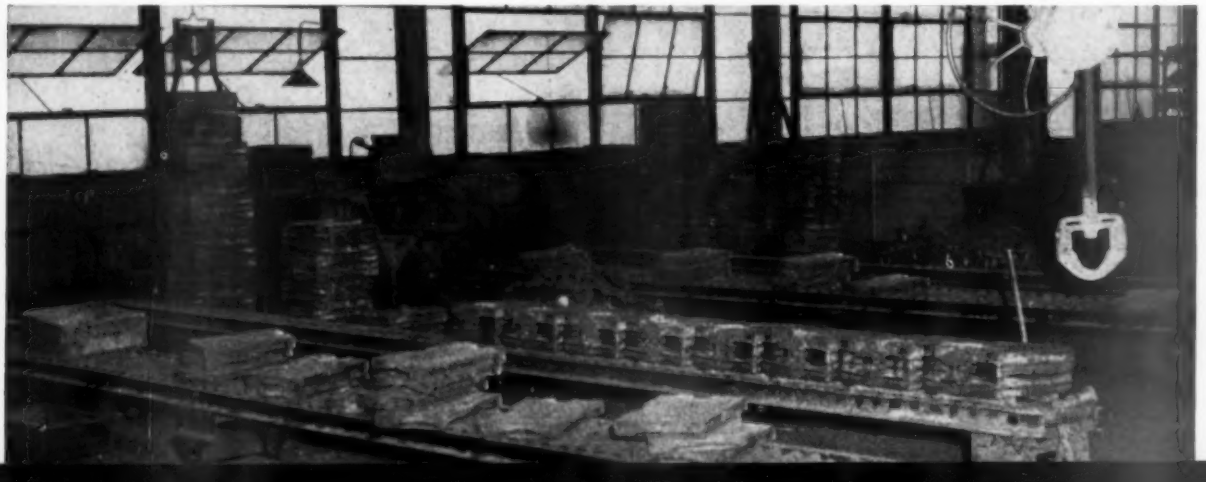
Erie's tight foundry labor situation influenced the company's decision to erect the new foundry in Albion. Cost of the building and new equipment was approximately $100,000, and two molding floors and sand-handling equipment are expected to be added in the future. The building measures 60 x 200 ft with walls 15 ft high. Construction is of concrete block and steel with windows covering practically all of the wall area. Floor is of concrete.

Four large air-conditioning units and heaters are suspended from the roof girders, and ample fluorescent lighting provides illumination during those times when sufficient light does not come through the huge windows. An automatically regulated, oil-fired boiler assures hot water for all uses including showers for the employees.

Combined production of the company's foundries will keep its machine shop working at capacity, eliminating the necessity of buying castings from outside. Castings produced in the Albion plant are for plumbing fixtures of all kinds and vary in size from ⅜ in. to 1¼ in. diam; the longest is 4 in. Two types of metal are used in production—a red and semi-red brass alloy.

Aluminum driers are used in coremaking, with the work about evenly divided between the benches and machines. Each of two air-operated machines turn out approximately 500 cores hourly. On the benches, two cartridge bench core blowers run about 200 cores hourly, each, and hand coremaking on small, simple pieces like a water plug averages about 1000 pieces per hour. One intensive mixer handles all the core sand, and one oven bakes the cores.

Eight air-operated molding machines are located just opposite four melting furnaces. Each molder has two conveyor lines extending to the center of the floor, and a monorail system carries the ladles from furnaces to ends of the conveyor lines for pouring. Each of three furnaces turns out 600 lbs of metal hourly, and the fourth furnace pours 400 lb of metal three times every hour. All furnaces are oil-fired.



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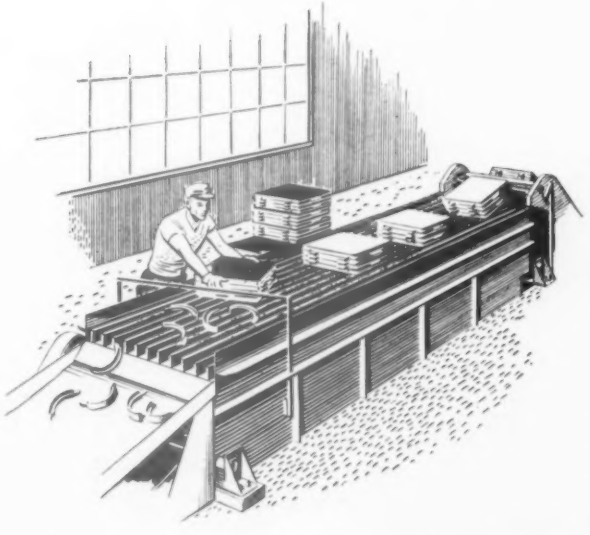
They do your job cheaper. They're "Job-Engineered" to enable fewer men to do more work . . . without damage to flasks or castings.

They do your job faster. They can be installed as an integral part of your conveyor system to assure a continuous productive flow.

They do your job better. They're positively self-discharging at all times because of their patented elliptical action.

Find out how Robins "Job-Engineered" Floatex Shakeouts can help save *your* time . . . *your* money. Write Robins today!



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FLOATEX SHAKEOUTS

"Job-Engineered" to solve your problem
CHEAPER . . . FASTER . . . BETTER

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MAN-TO-MAN
on the Molder's Bench

"Family Foundries"

By RALPH L. LEE

SINCE I've been knee-high to a grasshopper I've been warned against going into business with relatives, and I must say that plenty has happened to me to prove this point. However, in spite of it, I've been running into quite a few family affair foundries lately that seem to be hitting it off pretty good; in fact, I visited four on my last two trips.

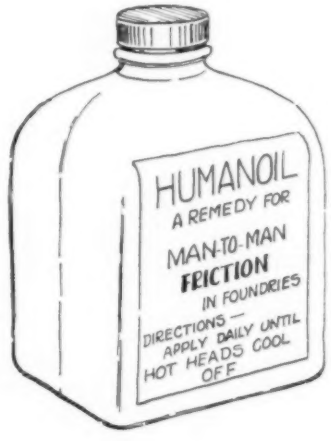
Of course, I appreciate that when any visitor goes through a foundry for the first time, his guide is more than likely to put the best foot forward and try at least to cover up any signs of organization hot boxes. On the other hand, I could read between the lines that practically all of the relatives in these foundries I visited were gearing in together unusually well and meshing much more smoothly than relatives are supposed to.

For instance, one son I remember didn't realize, I'm sure, the number of times he quoted and credited his dad during the trip. An uncle and a dad couldn't help but let me know that they and their kinfolk were seeing pretty much eye to eye and working shoulder to shoulder.

As a result of these experiences, I began to reason that if relatives can click it off together better in the foundry business than they seem to in others, there might be some sort of a lubricating oil, peculiar to the foundry, that tends to smooth out personal relations friction. If there is such an oil, I said to myself, then we ought to try to find out what it is, just like they did when they discovered penicillin. "Who can tell," I went on, "we might be able to collect the stuff, put it up in bottles and prescribe it as a remedy for Man-to-Man friction in any kind of a foundry, either family or otherwise."

Following my hunch, I began sizing up the four family foundries I had visited for a clew. In every case I discovered that the senior uncle or the dad who had started the business had been working at the molders trade all his life, and still liked it. Every once in a while, as each went about his work, something would come up which would cause him to say, "If I ever happen to have a foundry of my own, you bet your sweet life there's a thing I'm going to do." Later on he would catch himself saying, "When I do have a foundry of my own I most certainly will not do this and I know darned well that I will do that."

Finally the day came when he was surprised to find that by the skin of his teeth he might manage to start a place of his own. So with his life's savings and mortgages on about everything he owned, he scraped together a little old second-hand cupola or furnace and barely enough of



the things he had to have to start turning out castings.

Each of the foundry-starters were alike in another respect; they worked from morning till night, weekdays, Sundays and holidays, to such a point that the only way the family ever saw them was to come over to the foundry. Here's another thing they all did; they kept their promises and did those things they said they would do when they had a place of their own.

In every case their customers got the kind of castings they wanted, liked them so much they ordered more. Others hearing about this quality and service joined the ranks together with more and more employees. I found it wasn't easy sailing by any means, for there were times when everyone of them wondered whether they could possibly make the grade. In spite of this they stuck to their guns till they did.

While I feel pretty sure that almost any business gets started along these general lines, I doubt very much whether any other depends so much upon doing those extra things which almost any one can do in addition to those things no one can get out of doing. Almost everyone knows of businesses that got started by pulling rabbits out of hats, making inventions or through some trade secret. But from what I've seen of the foundry business, it's pretty much an open book for everyone to read. Metal seems to melt and cool in sand according to the same rules regardless of the sign over the door. This means to me that the doing of those extras which can be neglected at times, seems to spell the difference between mine run castings and top quality castings.

It could be that when some sons, brothers, nephews or cousins see that there couldn't have been any great mystery to the foundry business, or the old man couldn't have made such a go of it, they began toying with the idea of going into it themselves. Then, possibly, when it dawns upon them what attention to business, doing what has to be done regardless, plus certain tremendous trifles pay in

(*Concluded on page* 134)

LOOKING AHEAD... STAYING AHEAD THROUGH MODERN RESEARCH

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Socony-Vacuum's Vast Research Facilities!

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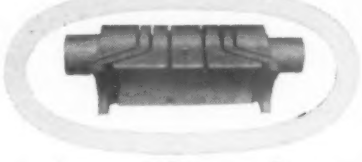
Certified Core Oil has long been preferred by foundry-men. It provides the advantages that result in better cores at lower cost.



Certified Core Oil comes in *three* groups—(1) CERTIFIED GOLDEN; (2) CERTIFIED UNIQUE; (3) CERTIFIED RAPIDRY. In one of these groups and grades is the ideal oil for your shop. Advantages provided by Certified Core Oils: make smooth, hard cores • work clean in boxes • less smoking easy shake out • minimum baking time.

Call in the CERTIFIED MAN *to help recommend* the RIGHT CORE OIL FOR YOUR SHOP!

For best results a core oil should be "prescribed for the job." To get the right oil for your jobs, let the Certified man know...

- **OPERATING CONDITIONS**
- **TYPE OF SAND USED**
- **TYPE OF METAL CAST**

He will make the necessary tests and recommend the oil best suited for your shop practice.

CORE OILS
SOCONY-VACUUM

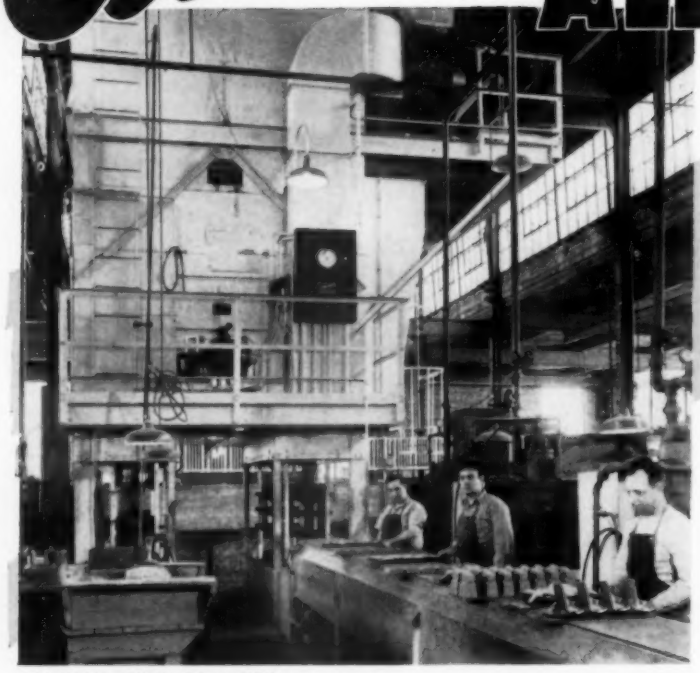
Certified Core Oil Division
Socony-Vacuum Oil Co., Inc.

3308-26 SOUTH CICERO AVE., CHICAGO 50, ILL.

AGENTS AND REPRESENTATIVES:

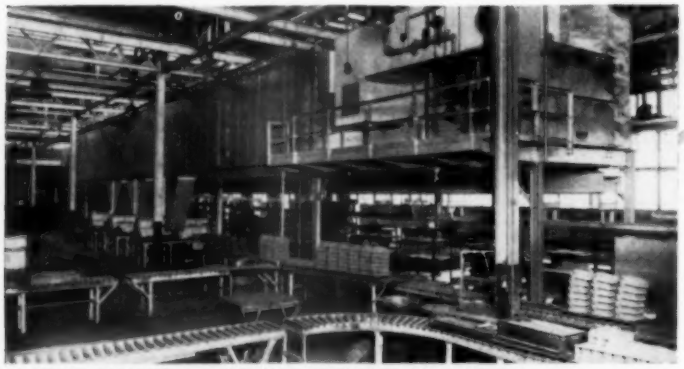
Buffalo, N.Y. • Elmira, N.Y. • Worcester, Mass. • Bloomfield, N.J. • Reading, Pa. Newtown, Ohio • Milwaukee, Wisc. • St. Louis, Mo. • Minneapolis, Minn. • Birmingham, Ala. • Houston, Tex. • Denver, Colo. • San Francisco, Calif. • Portland, Ore.

Eliminate ALL CORE BAKING With



COLEMAN TOWER CORE OVENS for high speed production. Patented Open Center permits loading from both inside and outside the Tower and increases loading accessibility as much as 300% compared with other vertical oven designs.

COLEMAN ROLLING DRAWER CORE OVENS for speedy baking of small and medium cores. Available in wide range of sizes and capacities.



COLEMAN HORIZONTAL OVERHEAD CONVEYOR CORE OVEN for production departments employing a large number of coremakers on work such as automotive, agricultural, etc., this design offers certain special advantages.

COLEMAN TRANSRACK CORE OVENS for operation with portable racks to reduce handling. Single or double rack capacity per compartment.

COLEMAN
CORE *and* MOLD OVENS

The **FOUNDRY**
CLEVELAND 13, OHIO

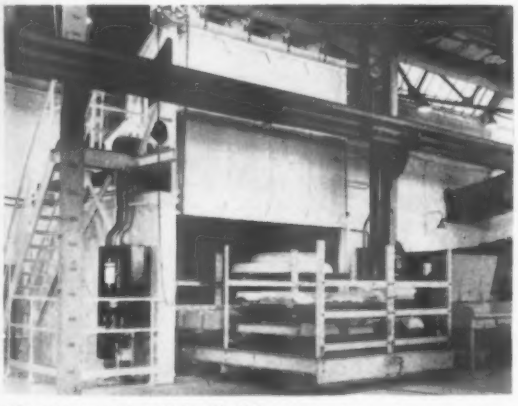
BUILDERS OF COLEMAN

UNCERTAINTIES COLEMAN OVENS

Profit by Coleman know-how! Coleman oven engineers offer a background of greatest experience—more than 40 years of continuous specialization in the ***foundry oven field*** and a record of more than 9,000 successful installations in all classes of foundry production.

Coleman Ovens remove the variables and uncertainties in core baking that are responsible for a large percentage of core losses and casting rejects due to improperly baked cores.

Coleman Ovens quickly pay for themselves through labor savings in the elimination of unnecessary losses. Increased production, lower fuel costs and improved working conditions are further advantages.



COLEMAN CAR TYPE OVENS for baking large cores or drying molds.

- Coleman Ovens are available for operation with any "automatic" fuel such as gas, oil, powdered coal, stoker coal, electricity, whichever is most economical to obtain in your district.

Write for Folio of Bulletins

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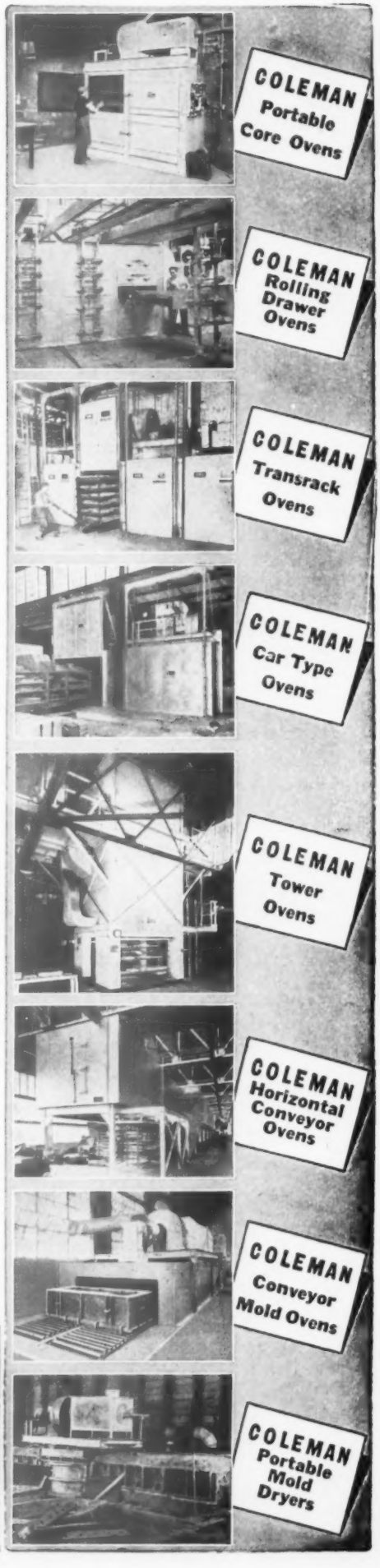
WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS!



Y EQUIPMENT *Company*

13, OHIO, U. S. A.

MEMBER FOUNDRY EQUIPMENT

AN AND SWARTWOUT OVENS

MAN-TO-MAN

(*Concluded from page* 130)

comparison to what they pay in other lines, they cast their lot with the craft.

Now as far as this lubricating oil business is concerned, I've come to the conclusion that the stuff really does exist. I believe it's a by-product of several things peculiar to the foundry—something on this order. No matter how big the cupola or small, or how many of them are used, metal simply will not melt until certain specific things are done, done right and done right now. When it does condescend to melt, it insists upon being poured, it won't wait and it's darned particular where it is poured. It simply won't stand any foolishness from anybody.

What I'm trying to get at is, that the metal itself is the top boss in any foundry and sand its first lieutenant. These two arbitrary bosses will stand just so much from anybody, but they are strictly fair and always give credit where credit is due regardless of pull or family connections.

This being the case the two-legged individuals who go around carrying the titles of boss are only the agents of the real bosses, only their interpreters or errand boys.

While I haven't finished my oil research project by any means, I've gone far enough to discover that most of the man-to-man hotboxes I've run across are due either to the two-legged bosses or those reporting to them, forgetting who is really boss around the place. When it is discovered that the business itself is the boss in every sense of the word, and a fair one at that, who won't stand for any shenanigans from anybody, regardless of who they are, then petty jealousies, self-pity, unfairness and greed are likely to evaporate. If *they* don't evaporate the business soon *will*. Of course I could be on the wrong track, but on the other hand I don't think I am.

Foundry Statistics

(Reported by Bureau of the Census)

Copper-base Alloy Castings

(Thousands of pounds)

	Shipments			
	Total	Sand	Perm. Mold	Unfilled *Orders
1946				
Jan.	72,265	65,107	1,886	71,827
Feb.	60,856	56,992	1,713	72,736
Mar.	74,971	66,076	2,353	70,622
Apr.	77,919	71,105	2,390	71,108
May	76,054	70,748	2,453	76,792
June	70,910	66,378	1,755	78,449
July	66,695	62,369	2,339	78,018
Aug.	77,733	72,158	2,376	77,538
Sept.	76,835	71,545	2,415	84,183
Oct.	89,148	83,610	2,559	80,770

* For sale only.

Aluminum Castings

(Thousands of pounds)

	Shipments			
	Total	Sand	Perm. Mold	Unfilled *Orders
1945				
Jan.	45,588	27,168	10,692	.....
Feb.	44,091	26,674	9,844	.....
Mar.	50,275	29,473	12,355	.....
Apr.	46,320	27,090	11,185	.....
May	43,323	24,398	10,977	.....
June	39,074	21,050	10,254	.....
July	31,130	15,373	8,859	.....
Aug.	22,845	11,384	6,568	.....
Sept.	15,805	7,313	5,325	.....
Oct.	19,825	8,410	7,647	.....
Nov.	18,961	8,137	7,305	.....
Dec.	17,770	7,222	7,248	.....
1946				
Jan.	23,568	9,556	10,131	83,541
Feb.	23,231	11,613	7,866	94,858
Mar.	26,661	10,792	11,305	97,013
Apr.	27,692	11,562	11,010	100,267
May	29,179	11,827	12,220	117,710
June	28,496	11,674	11,767	118,747
July	28,828	10,706	12,213	124,457
Aug.	33,845	12,721	14,309	133,510
Sept.	32,003	12,445	13,045	136,237
Oct.	39,917	14,559	17,311	144,276

* For sale only.

Magnesium Castings

(Thousands of pounds)

	Shipments			
	Total	Sand	Perm. Mold*	Unfilled Orders†
1945				
Jan.	10,424	6,149	4,028	.....
Feb.	10,366	5,832	4,317	.....
Mar.	12,646	6,703	5,677	.....
Apr.	11,903	6,257	5,464	.....
May	12,134	6,081	5,865	.....
June	10,566	4,878	5,473	.....
July	9,838	3,961	5,677	.....
Aug.	4,960	1,820	3,036	.....
Sept.	169	137	13	.....
Oct.	251	216	13	.....
Nov.	236	208	15	.....
Dec.	261	230	14	.....
1946				
Jan.	398	349	16	3,114
Feb.	438	366	35	3,338
Mar.	594	525	33	3,484
Apr.	570	465	36	3,297
May	661	587	45	3,778
June	717	623	46	4,063
July	628	477	53	3,986
Aug.	694	568	56	4,234
Sept.	811	676	61	4,096
Oct.	921	733	73	4,219

* Includes incendiary bomb castings.
† For sale only.

Gray Iron Castings

(Net tons)

	Shipments		Unfilled *Orders
	Total	For sale	
1945			
Jan.	861,524	536,499	1,921,572
Feb.	816,467	511,184	1,998,270
Mar.	927,925	587,380	2,089,046
Apr.	842,979	532,015	2,031,668
May	866,951	542,337	2,031,318
June	849,449	543,788	2,015,625
July	748,790	468,017	2,015,005
Aug.	750,050	462,364	1,817,801
Sept.	717,768	434,416	1,754,515
Oct.	767,209	461,720	1,741,981
Nov.	751,092	445,952	1,847,468
Dec.	678,091	397,529	1,877,095
1946			
Jan.	706,319	446,567	2,076,994
Feb.	541,177	368,384	2,152,766
Mar.	796,068	505,431	2,265,336
Apr.	856,678	529,323	2,378,348
May	757,041	454,194	2,491,811
June	735,060	435,866	2,633,118
July	810,829	475,059	2,668,782
Aug.	944,516	558,957	2,785,609
Sept.	913,824	534,310	2,881,906
Oct.	1,051,068	610,389	2,916,268
Nov.	964,300	552,696	2,888,219

* For sale only.

Malleable Iron Castings

(Net tons)

	Shipments		Unfilled *Orders
	Total	For Sale	
1945			
Jan.	78,788	54,111	345,112
Feb.	75,220	51,089	341,558
Mar.	85,307	58,711	349,935
Apr.	76,065	51,011	346,421
May	79,565	52,789	328,471
June	71,992	47,510	285,210
July	55,813	35,439	284,017
Aug.	52,647	33,239	282,136
Sept.	46,960	28,506	219,905
Oct.	59,096	37,307	229,618
Nov.	57,315	36,007	227,309
Dec.	51,963	35,168	236,648
1946			
Jan.	53,685	38,181	245,878
Feb.	40,156	29,338	247,644
Mar.	50,235	33,978	263,227
Apr.	65,010	36,298	275,055
May	62,598	34,975	279,065
June	61,650	35,468	275,845
July	64,446	38,021	271,981
Aug.	67,903	41,345	272,440
Sept.	69,516	39,634	277,309
Oct.	79,207	46,477	280,972
Nov.	68,987	39,328	275,943

* For sale only.

Steel Castings

(Net tons)

	Shipments		Unfilled Orders
	Total	For Sale	
1945			
Jan.	210,213	165,116	983,137
Feb.	191,361	152,082	1,045,374
Mar.	222,591	173,506	1,047,660
Apr.	137,737	154,883	1,018,930
May	192,921	149,623	852,877
June	173,685	129,193	776,265
July	139,315	102,428	728,397
Aug.	131,411	98,080	565,559
Sept.	114,613	83,751	513,758
Oct.	130,344	99,495	460,339
Nov.	123,048	91,409	443,773
Dec.	115,239	85,391	434,287
1946			
Jan.	99,058	77,071	*358,926
Feb.	57,423	45,151	390,077
Mar.	101,396	80,843	412,325
Apr.	146,327	108,586	392,790
May	129,211	94,630	381,654
June	123,551	91,715	361,293
July	119,157	84,422	362,581
Aug.	130,450	94,653	374,731
Sept.	126,415	90,675	383,951
Oct.	138,206	98,945	389,002
Nov.	130,813	93,930	383,951

* For sale only. Unfilled orders for 1945 include tonnage for sale and own use.

WHAT MOLYBDENUM DOES FOR STEEL . . .

Wear is of course the great destroyer of gears, cams, and pinions; and wear resistance is one of the cardinal properties of steel to which Molybdenum contributes the most. Whatever the type or size of gear, and whatever the service in which it is used, if it wears out too fast when made of carbon steel, it will last much longer when a carbon-molybdenum steel is adopted. Not mere abrasion alone, but the effects of high temperature need often to be considered, and against these also resistance is very greatly improved by the addition of Molybdenum, either with or without such other alloying elements as nickel and chromium, according to service requirements.

The Molybdenum Corporation, as a supplier of Molybdenum, Tungsten, Boron, and other alloying materials, welcomes opportunity to advise or assist any user.

MASTER CRAFT ALLOYS

AMERICAN Production, American Distribution, American Control, Completely Integrated.
Offices: Pittsburgh, New York, Chicago, Cleveland, Detroit, Los Angeles, San Francisco, Seattle.
Sales Representatives: Edgar L. Fink, Detroit; Brumley-Donaldson Co., Los Angeles, San Francisco, Seattle.
Subsidiaries: Cleveland-Tungsten, Inc., Cleveland, O.; General Tungsten Manufacturing Co., Inc., Union City, N. J.
Works: Washington, Pa.; York, Pa.
Mines: Questa, New Mexico; Urad, Colorado.

MOLYBDENUM CORPORATION OF AMERICA
GRANT BUILDING PITTSBURGH, PA.

MCA

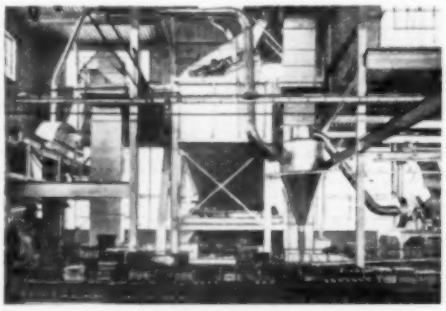
GENERAL LAYOUT

Jeffrey
EQUIPPED

NEW MODERN

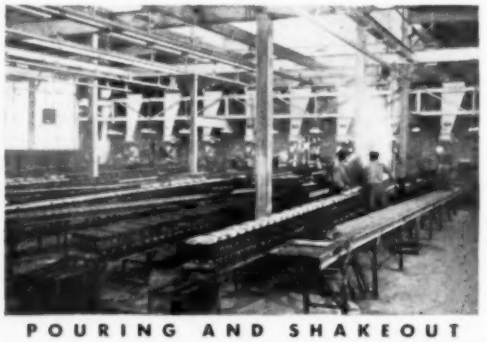
BRASS FOUNDRY

MAKING PLUMBING GOODS



CONDITIONING

DISTRIBUTING



POURING AND SHAKEOUT

THE JEFFREY MANUFACTURING COMPANY

907-99 North Fourth St., Columbus 16, Ohio

Complete Line of Material Handling, Processing and Mining Equipment

Baltimore 1	Buffalo 2	Cleveland 13	Harlan	Jacksonville	Pittsburgh 22
Birmingham 3	Chicago 1	Denver 2	Houston 5	Milwaukee 11	St. Louis 3
Boston 16	Cincinnati 2	Detroit 13	Huntington 19	New York 7	Salt Lake City 1
				Philadelphia 3	Scranton 3

AFA Light Metal Committees Named

Appointments to four 1947 aluminum and magnesium division committees of the American Foundrymen's Association have been announced by S. C. Massari, technical director. The committees and appointments are:

Program and Papers—W. E. Martin, National Smelting Co., Cleveland, chairman; Oscar Blohm, co-owner, Triangle Foundry Co., Chicago; Dr. L. W. Eastwood, assistant supervisor, process metallurgy division, Battelle Memorial Institute, Columbus, O.; A. W. Stolzenburg, process and products engineer, Aluminum Co. of America, Cleveland, and Dr. Robert Thomson, metallurgist, International Nickel Co. Inc., Detroit.

Reclamation and Alloying — Walter Bonsack, director of laboratories, National Smelting Co., Cleveland, chairman; E. J. Basch, research engineer, and J. C. Fox, chief metallurgist, Doehler-Jarvis Corp., New York; M. E. Brooks, foundry engineer, Dowmetal foundry, Dow Chemical Co., Bay City, Mich.; Charles Cooper, chief metallurgist, Acme Aluminum Alloys Inc., Dayton, O.; F. J. Francis, vice president, Metals and Alloys, Leaside, Ont.; W. H. Gunselman, director of research, Samuel Greenfield Co., Buffalo, N. Y.; R. A. Quadt, Federated Metals Division, American Smelting & Refining Co., Perth Amboy, N. J.; A. Sugar, metallurgist, American Metal Co., New York, and H. R. Youngkrantz, assistant chief metallurgist, Apex Smelting Co., Chicago.

Shrinkage and Porosity—J. C. DeHaven, research engineer, Battelle Memorial Institute, Columbus, chairman; Walter Bonsack; Dr. L. W. Eastwood; C. E. Nelson, technical director, magnesium division, Dow Chemical Co., Midland, Mich., and W. E. Sicha, research metallurgist, Aluminum Co. of America, Cleveland.

Test Bars—David Basch, technical representative, Almin Ltd. of Great Britain, Schenectady, N. Y., chairman; E. J. Basch; Walter Bonsack; M. E. Brooks; Dr. Blake M. Loring, senior metallurgist, Naval Research Laboratory, Washington, D. C.; J. W. Meier, head, nonferrous section, physical-metallurgical research laboratories, Canadian Bureau of Mines, Ottawa, Ont.; H. J. Rowe, chief metallurgist, castings division, Aluminum Co. of America, Pittsburgh, and T. D. Stay, assistant to the president, Reynolds Metals Co., Cleveland.

Nonferrous Casting Shipments at Peak

Shipments of aluminum castings in October attained the largest volume since May, 1945, with a total of 40 million pounds, 25 per cent greater than the 32 million pounds shipped in September, according to a report of the Bureau of the Census, Department of Commerce. Permanent mold castings increased to 17 million pounds, the maximum ever recorded for a single month; all other types of aluminum castings established a postwar peak.

October shipments of copper-base alloy castings advanced sharply to 89 million pounds and established a new high for the year. Sand castings comprised 94 per cent of the October shipments.

Total magnesium casting shipments, as well as shipments of each type of magnesium casting, reached a new high in October with 921 thousand pounds. Sand castings comprised 80 per cent of this total.

View of the Meehanite Metal Corp. display at the 28th annual National Metal Congress and Metal Exposition, Atlantic City, N. J., Nov. 18 to 22. Many Meehanite metal castings manufactured by different companies were displayed.

THE PUBLIC VISITS A FOUNDRY

(*Concluded from page 92*)

filling them with sand in an invisible stream from a high-power sandslinger. After being poured they are carried automatically away through long, winding tunnels where the iron cools and the hot gases are ventilated off.

"In addition to plant equipment, Belle City has a large fund of employee good will. Several workmen stopped your reporter on his tour to proudly tell him the function he (the workman) plays in the setup and what certain machines will do.

"The company has had no serious labor trouble since 1922. It bargains with UAW Local 553 for production and maintenance employees. More than half the employees have been with the company more than five years and 121 are members of the Twenty Year Club.

"The Belle City Welfare Association helps employees of the firm, and the company maintains a group insurance plan which was started 20 years ago and is still being improved. Hospital surgical, sickness and disability benefits for the worker's family have been included, with the company paying part of the cost. An active credit union also functions among the employees.

"President of the company is C. S. Anderson, whose shrewdness and ability to recognize the human element in the industrial process, is ascribed as the reason for much of Belle City's success. But it is not a one-man affair—the spirit of co-operation extends throughout the plant."

Magnesium Exhibit To Open Feb. 4

Magnesium Association, 30 Rockefeller Plaza, New York and the U. S. Army Air Forces jointly will sponsor a magnesium exhibit at Wright Field, Dayton, O., Feb. 4-6. Invitations have been sent to 3000 leading industrial executives and engineering representatives, and Army and Navy designing and engineering personnel will attend by official request.

A comprehensive demonstration of present practices and latest developments in magnesium technology has been arranged through exhibits of participating companies, the Army and the Navy. These exhibits will show design, fabrication and application of today's magnesium production.

Engineers and technical representatives will be present to answer questions and explain techniques of production and fabrication. The exhibit will be open from 12:30 to 10 p.m. each of the three days.

Industry BRIEFS

UNITED STATES Casting Co., Edwardsville, Ill., has been established as a jobbing foundry by Frank and T. C. Hamlin Jr. as partners. The shop has about 10,000 sq ft of floor space and is equipped with all new and modern facilities for the production of aluminum castings. Buffing, polishing, engineering service and limited machining also is offered.

Allied Foundries, 6217 Wilmington Ave., Los Angeles, owned by H. H. Roche, has obtained approval for construction of a factory building on Lena St., South Monte, Calif., to cost about $9000.

Reeves Pulley Co., Columbus, Ind., has established a branch office in the Wilford Bldg., 33rd & Arch Sts., Philadelphia 4. Philip C. Talbot is branch office manager, and is assisted by William A. McCosh. A comprehensive stock of pulleys and replacement parts for all standard Reeves units will be carried. Territory covered by the branch office includes eastern Pennsylvania, most of Delaware and Maryland and northern Virginia.

Bison Industrial Supply, 551 Ellicott Square Bldg., Buffalo 3, was formed by Warren L. Pell Dec. 1 as a sales organization covering central and western New York and northwestern Pennsylvania. The following companies are represented: General Grinding Wheel Corp., Philadelphia; Bellevue Industrial Furnace Co., Detroit and Johnson Fuller Co., Los Angeles.

Reedsburg Foundry Co., Reedsburg, Wis., recently incorporated, has begun construction of its 80 x 310 ft foundry building in the area bordered by Ash, Birch and North Badger Sts. Company plans to start operations in March and will produce gray iron and aluminum castings.

Schnacke Inc., manufacturer of machinery at 1102 East Columbia Ave., Evansville, Ind., has completed a foundry building and has begun casting of gray iron, aluminum and brass castings. The foundry will make castings for a large air compressor, manufacturing rights for which have been purchased from Servel Inc., Evansville. Ray Smith is foundry superintendent.

Gray iron casting production for November in the Philadelphia Federal Reserve district was 11.7 per cent under that of October and 0.9 per cent below that of November, 1945, according to the University of Pennsylvania's Industrial Research department. Malleable iron production was down 26 per cent from October but 47.8 per cent above that of November, 1945. Steel casting production was 15.2 per cent below that of October and 13.6 per cent below last year. Pig and scrap iron stocks in iron foundries were below the month before but coke supplies were higher. In steel foundries the opposite was true. Unfilled orders for iron castings were higher and for steel castings lower than at the close of October.

Griswold Mfg. Co., Erie, Pa., has been sold to an eastern syndicate which will continue operations of the company under its present name. The new management includes the following officers: President, I. Tachna; vice presidents, J. M. Schaap and J. Arronson; secretary, Samuel S. Flug; treasurer, A. S. Weissman.

American Well Works has increased productive capacity of its pump division between 40 and 50 per cent through completion of a new gray iron foundry at its principal plant in Aurora, Ill. The company's other gray iron foundry, formerly the Atlas Foundry, Chicago, acquired last July, is operating at full capacity.

Reliable Pattern & Castings Co., 3530 Spring Grove Ave., Cincinnati 23, has changed its name to Reliable Castings Corp., as of Jan. 1. The company manufactures brass, bronze and aluminum castings, permanent mold aluminum castings and pressure cast aluminum matchplate castings.

Blue Ridge Pressure Castings Inc., Lehighton, Pa., commenced operations in January in the new company's plant, located adjacent to the Lehighton airport. Heading the company, which operates high-pressure die casting machines exclusively in production of brass castings, mainly for the plumbing and hardware trade, are Thomas C. Wilson, manager, and Allen B. Behler, superintendent.

Fire of undetermined origin practically destroyed the Plymouth Foundry Inc., Plymouth, Ind., Dec. 18, with damage in excess of $25,000. William Schlosser, company president, said that the plant would be rebuilt. The foundry was only recently reorganized, having been closed down during the war; before the war it was known as the Argos Foundry Co.

Briggs Mfg. Co., Detroit, has purchased Republic Brass Co., Cleveland, to round out its line of plumbing fixtures and associated items. Through this acquisition and the earlier purchase of John Douglas Co., Cincinnati, the Briggs company now makes a complete line of bathroom fixtures as well as kitchen sinks and laundry trays.

Terminal Castings Co., 1678 Leonard Ave., Cleveland, formerly owned by a partnership involving J. P. Reamer and A. W. Pressman, has been taken over by a newly formed corporation of the same name. New owners plan to expand the firm which manufactures nonferrous castings.

Metal-Mold Magnesium Corp., 95 Hamilton St., Cedarburg, Wis., has purchased the government-owned magnesium casting plant which it operated during the war. According to the War Assets Administration, Chicago, purchase price was $50,000.

Alloy Service Foundry, Highway 65 near Pine Bluff, Ark., has been opened for business recently. It is owned by Charles J. Bridges and Havis Socia. The latter is the former owner and operator of the White Hall Aluminum Co.

Kenton Foundries Inc., Frederick Bldg., Cleveland, is building a 60 x 135 ft addition to its plant at 333 North Market St., Kenton, O. Company manufactures gray iron castings for use in autos, refrigerators and heating systems.

Hardy Mfg. Co., Pendleton, Ind., has added a die casting department and is manufacturing zinc automobile horn rings and ornamental sections for several automobile manufacturers. Ben Antrobus has been appointed foundry superintendent.

Jerry Curto, Frank C. Cygan and Robert D. Payne purchased the Ligonier Magnesium & Aluminum Foundry, Ligonier, Ind., as of Sept. 28, 1946, and are operating under the name of Curto-

(*Concluded on page* 140)

Both man and grinding wheel on this snagging job must be plenty tough . . . and toughness is one of the features scientifically "built" into BAY STATE SNAGGING WHEELS AND CONES. This rugged quality is not all. BAY STATE'S special resinoid and vitrified bonds assure faster, cleaner, stock-removing action, resulting in a definite increased economy. Our unique method of rigidly imbedding the steel nut, on the taper cup shapes, is an added safety factor.

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Top Performance Consistently Duplicated

BAY STATE ABRASIVE PRODUCTS CO. • WESTBORO, MASSACHUSETTS, U.S.A.

(*Concluded from page* 138)

Ligonier Co., producing aluminum castings exclusively. All three men were formerly with Acme Aluminum Foundry Co., Chicago.

° ° °

Clifford Foundry Co. has opened a foundry at Fourteenth and Ottawa Sts., Leavenworth, Kans.

° ° °

New Central State Foundry Co., Cape Girardeau, Mo., owned by Robert and Mrs. Erlbacher, R. E. and Mrs. Hall and Miss Alma Erlbacher, is in partial operation with 43 employees. Firm is now casting parts for stoves, electric fans and electric motors.

° ° °

Shipments of ingot brass and bronze during November by 53 ingot brass and bronze manufacturers were 29,232 tons, according to the Defense Council of the Ingot Brass and Bronze Industry. This total is believed to represent over 95 per cent of the entire industry's deliveries and compares with 31,461 tons for October.

° ° °

M. F. Becker & Associates, Chicago, manufacturers representatives in foundry and conveyor lines, have moved their offices from 211 West Wacker Dr., to Room 317, Peoples Gas Bldg., 122 South Michigan Ave., Chicago 4.

° ° °

Duramold Castings Co., 126 East Seventh St., Mishawaka, Ind., recently was opened by Frederic H. Craven, general manager. This concern is casting aluminum and brass in both sand and permanent molds.

° ° °

Manning-Owen Foundry & Machine Co. has been incorporated in Los Angeles county with capital of $200,000. Directors are J. H. Manning, Anne H. Manning and H. O. Owen.

° ° °

Mark Jones Foundry Inc., Los Angeles county, has been organized with $75,000 capital. Directors are Mark F. Jones Jr., W. L. Engelhardt and A. C. Campbell.

° ° °

Duplex Foundry Co., 598 West River St., Elyria, O., plans erection of a 40 x 200 ft quonset type factory building on West River St. at a cost of $9000.

° ° °

Arrow Aluminum Co., 3135 Berea Rd., Cleveland, plans erection of a one-story foundry addition and installation of additional equipment for producing castings.

° ° °

Seeger-Sunbeam Corp., Evansville, Ind., has changed its name to Seeger-Refigerator Co. Inc., effective Nov. 21, 1946.

° ° °

Process Pattern & Engineering Co., 223 East Main St., Fort Wayne, Ind., was formed recently by Roland N. Cole and Luther D. Blickenstaff.

° ° °

Gwin Brothers Pattern Shop, formerly at 1916 North Thirteenth St., has moved to a larger building at 1937 East Ash St., Terre Haute, Ind.

° ° °

Solon Foundry Co., Solon, O., recently incorporated to manufacture aluminum castings, will erect a foundry building on SOM Center Rd., Solon. Ralph Mc Veen is treasurer of the company.

° ° °

The recently organized McDonough Foundry & Machine Co., McDonough, Ga., completed new buildings and started production in January.

° ° °

J. M. Bell Foundry, Lynchburg, Va., was destroyed by fire Nov. 29. Damage was estimated at $25,000.

WISCONSIN CONFERENCE

Program Is Announced

ANNOUNCED program for the Wisconsin annual Regional Foundry Conference, to be held at Hotel Schroeder, Milwaukee, Thursday and Friday, Feb. 13-14, includes 25 technical papers in addition to five addresses at general and luncheon meetings. The conference is being sponsored by the Wisconsin Chapter of the American Foundrymen's Association and the University of Wisconsin.

The technical program will start Thursday afternoon at 2 o'clock, with additional sessions scheduled for Friday morning and afternoon. Six simultaneous sessions will be held both days by the steel, gray iron, malleable iron, nonferrous, pattern and technical groups. The two luncheon meetings will be addressed by LeRoy E. Luberg, assistant to the president, University of Wisconsin, and by Carl Taylor, while Dr. Clark Kuebler, president, Ripon College, will speak at the banquet to be held Thursday evening. Speakers at the two general meetings will be James Thomson, Continental Foundry & Machine Co., East Chicago, Ind., and Frank G. Steinebach, editor, THE FOUNDRY.

Chairman for this tenth regional conference to be held in Wisconsin the last 20 years is R. J. Anderson, Belle City Malleable Iron Co., Racine. R. C. Woodward, Bucyrus-Erie Co., South Milwaukee, is co-chairman and Profs. R. E. Shorey and George Barker, University of Wisconsin, are associate chairmen.

The complete program for the conference follows:

THURSDAY, Feb. 13

9:00—Registration
10:00—Opening address, Dean Withey, University of Wisconsin.
10:30—General meeting, "Good Housekeeping," James Thomson, Continental Foundry & Machine Co.
12:00—Luncheon meeting, "America Tomorrow," Carl Taylor.

2 p. m. Sessions

STEEL—"Modern Developments in Gating and Risering," Howard Taylor, Massachusetts Institute of Technology.
GRAY IRON—"Core Sand Testing and Core Practice," J. Meyer, Werner G. Smith Co.
MALLEABLE IRON—"Mechanization for the Malleable Jobbing Foundry," Lester B. Knight, consulting engineer.
NONFERROUS—"Radiographic examination of Brass and Bronze Castings," William Baer, Naval Research Laboratory.
PATTERN—"Plastic Patterns," Mr. Salach, Plastic Laboratories.
TECHNICAL—"Practical Interpretations of Hardenability," E. J. Wellauer, Falk Corp.

3:40 p. m. Sessions

STEEL—"Reduce Costs by Eliminating Nonessential Operations," J. Richard Adams, Crucible Steel Castings Co.
GRAY IRON—"Cupola Control and Melting," Tom Barlow, Battelle Memorial Institute.
MALLEABLE IRON—"Modern Inspection Methods of Malleable Castings," U. S. Sullivan, Caterpillar Tractor Co.
NONFERROUS—"Nonferrous Melting Atmospheres," Herman Smith, Federated Metals Division.
PATTERN—"Magnesium Pattern Equipment," Lee Cress, Howard Foundry Co.
TECHNICAL—"Dialetric Curing of Cores," J. W. Cable, Induction Heating Corp.

Banquet, 6:30 p. m.

Speaker, Dr. Clark Kuebler, president, Ripon College.

Friday, Feb. 14, 10. a.m. Sessions

STEEL—"Shot and Grit for Metal Blasting" James T. Gow, Battelle Memorial Institute and "Grinding Wheels Testing Methods," M. J. Kolthoff.
GRAY IRON—"Annealing and Stress Relief—Effect on Physical Properties," James Vanick, International Nickel Co.
MALLEABLE IRON—"Stack Molding in the Malleable Foundry," L. D. Pridmore, International Molding Machine Co.
NONFERROUS—"Nonferrous Foundry Sands," George Anselman, Goebig Mineral Supply Co.
PATTERN—"Copper Patterns by Electric Forming," A. K. Laukel, Electro-Chemical Pattern Co.
TECHNICAL—"Recent Research in Machineability," A. O. Smith, Kearney & Trecker Corp.

Luncheon, 12 noon

"Education and Industry," Dr. LeRoy E. Luberg, assistant to president, University of Wisconsin.

2 p.m. Sessions

STEEL—"What Do You Know About New Materials and Methods for the Production of Steel Casting?" Charles W. Briggs, research director, Steel Founders' Society of America.
GRAY IRON—"Synthetic Sand Control," Norman J. Dunbeck, Eastern Clay Products Inc.
MALLEABLE IRON—"Some Factors Affecting Annealing," W. D. McMillan, International Harvester Co.
NONFERROUS—"Foundry Costs," J. W. Wolfe, Non-Ferrous Founders' Society.
PATTERN—"New Pattern Methods," A. Pfeiffer, Allis-Chalmers Co.
TECHNICAL—"Structure and Properties of Cast Iron as Affected by Alloying and Inoculation," C. O. Burgess, Union Carbide & Carbon Research Laboratories Inc.
General Meeting, 3:40 p.m.—"Recent Progress in the Foundry Industry," Frank G. Steinebach, editor, THE FOUNDRY.

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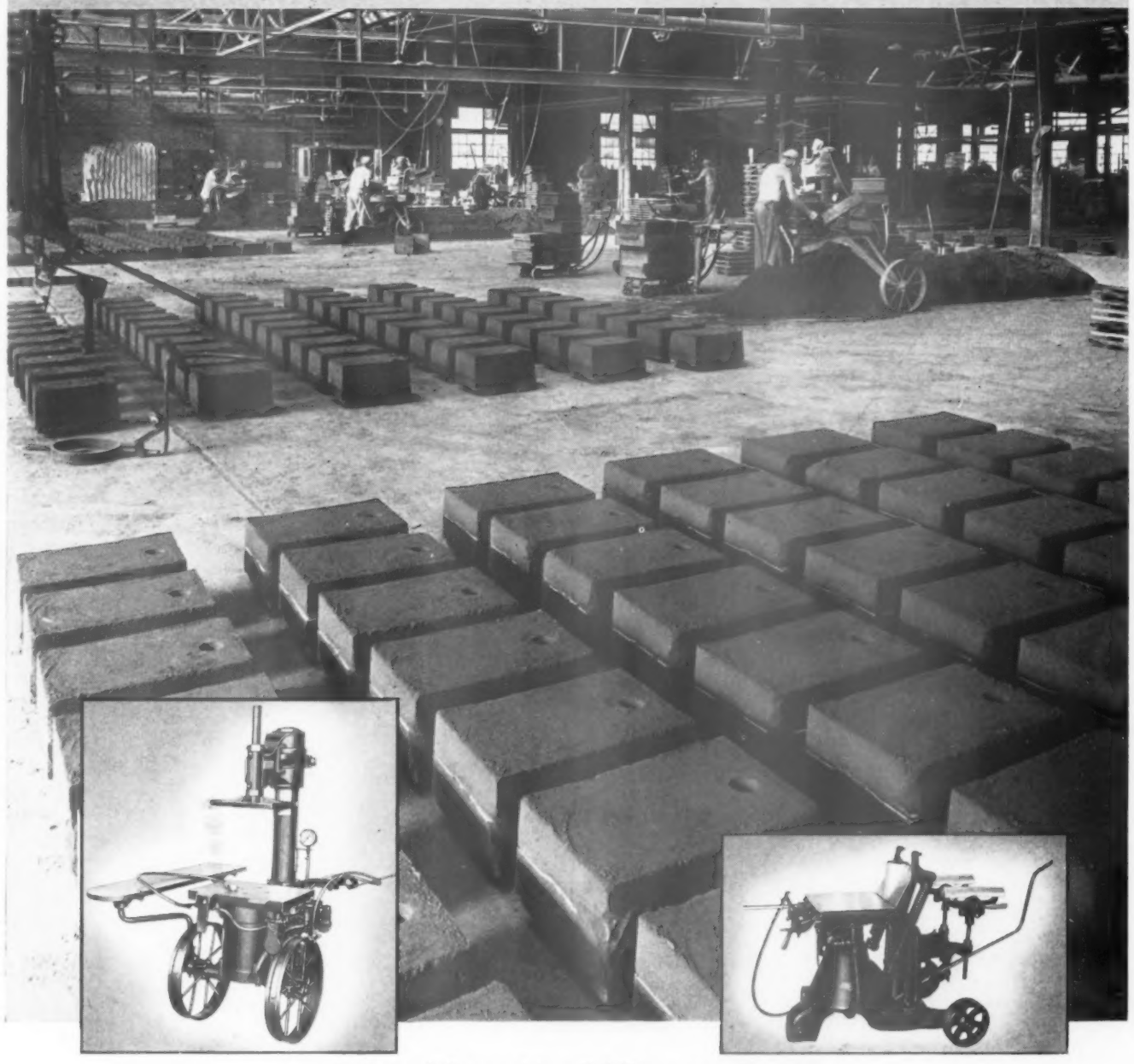

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Activities of Foundry

GROUPS

Michiana

MICHIANA Chapter of the AFA held Top Management and National Officers' Night at the Bronzewood Room, Hotel LaSalle, South Bend, Ind., Dec. 3. John McAntee, chapter chairman, welcomed the representatives of top management and introduced William Maloney, national secretary-treasurer, who, in a brief talk, listed the following advantages of AFA membership:

1. Advantages to all members to participate in the exchange of valuable information on foundry practices.

2. Experience and information gained through participation in the development of foundry standards, practices and research in foundry projects.

3. The assistance and co-operation of national headquarters in chapter activities and also in the solution of foundry problems.

Mr. Maloney paid special tribute to AFA members for their committee work in the development of practices and methods for more efficient foundry production. He also informed the chapter of the publication of a new series of articles soon to be released on cupola research, gating and heading of castings, microscopic uses and the history of the foundry industry.

Main speaker for the evening was G. R. Targett, treasurer, Sibley Machine & Foundry Co., South Bend. His subject was "Castings Costs and Selling Prices," and he outlined the importance of proper foundry accounting procedures in order to provide accurate costs.

Mr. Targett presented several formulas for determining costs and explained the results produced on profits and losses. He also stated that prices quoted on castings must be based on truly actual costs to bring about better competition. In conclusion he urged a constant analysis of costs to bring about a consciousness by foundrymen of the need for further research and improvement of foundry functions and operations.—*S. F. Krzeszewski, publicity chairman.*

Philadelphia

REGULAR monthly meeting of the Philadelphia Chapter of the AFA was held Dec. 13, at the Engineers' Club. John B. Caine, metallurgist, Sawbrook Steel Castings Co., Lockland, O., in his discussion, "What Is Strength?" brought out many points on the performance of various metals of varying strengths. Edward Berry, Dodge Steel Co., Philadelphia, acted as technical chairman of the meeting, and with the assistance of L. Lane, metallurgist, Florence Pipe Foundry & Machine Co., Florence, N. J., kept the discussion going long after the speaker had presented his paper.

Annual Christmas party of the chapter was held Dec. 19 at the Benjamin Franklin Hotel, with 500 members and guests in attendance. Chairman B. A. Miller welcomed the guests before the banquet which included turkey with all of the "trimmings." Following dessert, a splendid floor show was witnessed and door prizes were awarded to the lucky guests, as finale.—*H. V. Witherington, publicity chairman.*

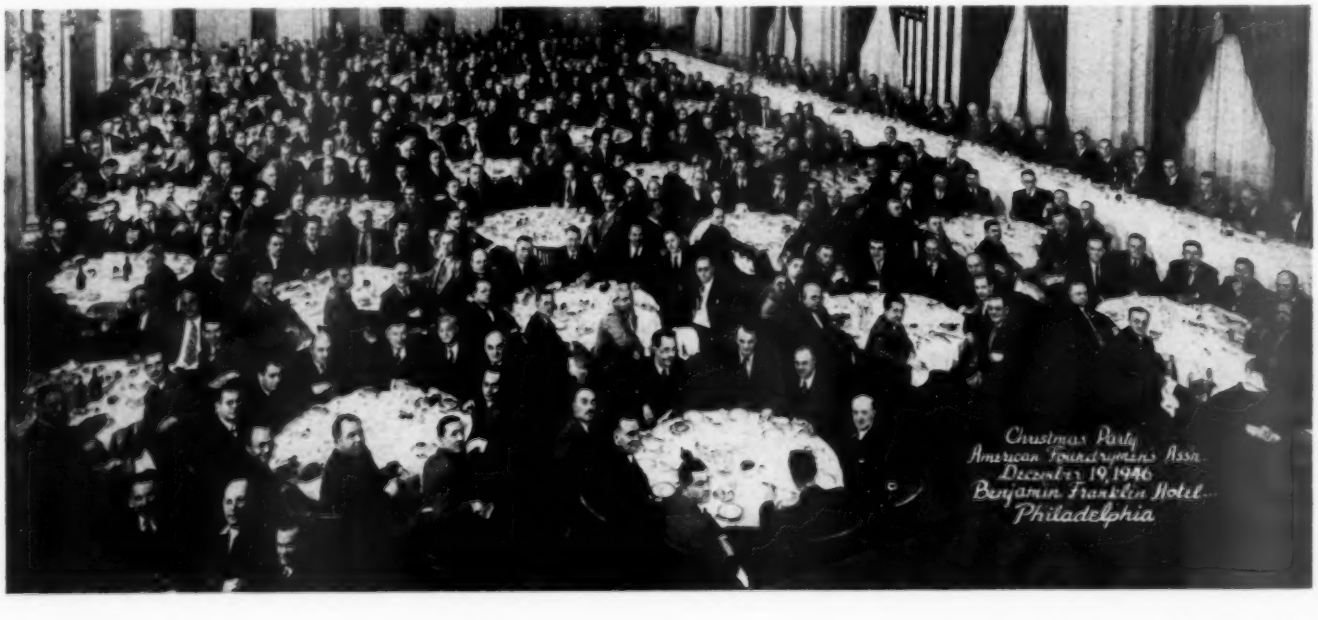
Northeastern Ohio

THE popular quiz type program attracted a large attendance at the Jan. 9, meeting of the Northeastern Ohio Chapter AFA at the regular meeting place, the Cleveland Club, Cleveland. National headquarters was represented by C. S. Massari, technical director, H. F. Scobie, educational assistant, Chicago, and Vice President Max Kuniansky, vice president and general manager Lynchburg Foundry Co., Lynchburg, Va.

Following an announcement by President Henry Trenkamp on a proposed movement to promote publicity and community interest in the foundry industry, and brief comment by Messrs. Kuniansky, Massari and Scobie, the meeting recessed and then reassembled under the chairmanship of Bruce Aiken, chapter vice president, to consider the program based on a series of written questions submitted during the preceding week. The questions ranged over a wide field and were distributed impartially and skilfully by ring master Aiken among his troupe of performers.

Tom West, vice president, West Steel Casting Co., supplied answers to the steel problems. Peter Rettig, president, Rettig Pattern Works Co., presented his views on various angles of the pattern-making business. Milton Tilley, metallurgist, National Malleable & Steel Castings Co., handled everything connected

(*Continued on page* 146)



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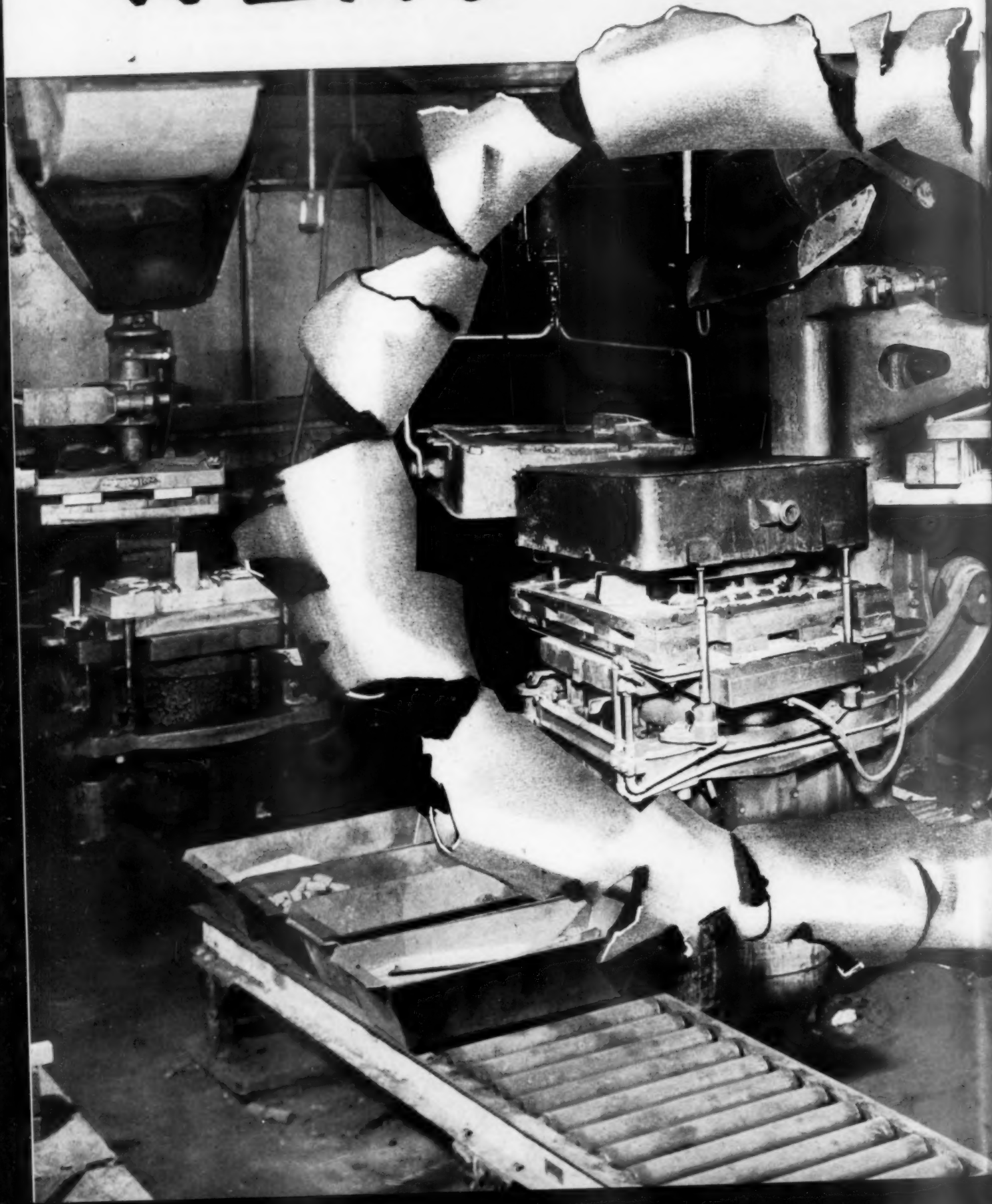

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DETROIT: Some of the 22 men present at the second annual reunion of past officers and directors of the Detroit Chapter of the AFA, held at the Fort Shelby Hotel, Detroit, Dec. 5. Reunion was arranged by E. C. Hoenicke, 1945-46 chairman. Left to right, (1)—W. J. Muhlitner, Great Lakes Foundry Sand Co.; P. W. Mulder, Almont Mfg. Co.; J. L. Mahon, American Car & Foundry Co.; Gordon C. Creusere, Semet-Solvay Co.; H. H. Wilder, Eaton Mfg. Co.; O. E. Goudy, Cadillac Motor Car Division, General Motors Corp. (2)—F. A. Jensen, National Engineering Co.; C. E. Silver, chapter vice chairman; O. F. Carpenter and J. E. Coon, Packard Motor Car Co. (3)—Jim Mahon; W. J. Cluff, Frederic B. Stevens Inc.; accordianist; J. P. Carritte Jr., True Alloys Inc. (4)—E. C. Hoenicke, Eaton Mfg. Co.; Art Allen, THE FOUNDRY; A. T. Waterfall, one-time president of the AFA; R. G. McElwee, Vanadium Corp. of America

(*Continued from page* 142)

with malleable iron. E. J. Vargo, metallurgist, Wellman Bronze & Aluminum Co., explained certain tricky points encountered in nonferrous foundry practice. Several miscellaneous questions were answered by Max Kuniansky in his usual highly competent and at times entertaining manner.—*Pat Dwyer*

° ° °

Approximately 1000 members and guests of the Northeastern Ohio Chapter of the AFA attended the chapter's twelfth annual Christmas party at Hotel Carter, Cleveland, Dec. 12.

L. P. Robinson, Werner G. Smith Co., Cleveland, was the one-man entertainment committee who made all party arrangements. In addition, when dinner was finished ahead of schedule, Robbie entertained the group for 45 minutes with songs, accompanying himself on the piano, until the floor show was scheduled to start. The show consisted of Al Berardi and his orchestra with numerous vaudeville acts which kept the group entertained for over two hours.—*Robert H. Herrmann.*

Ontario

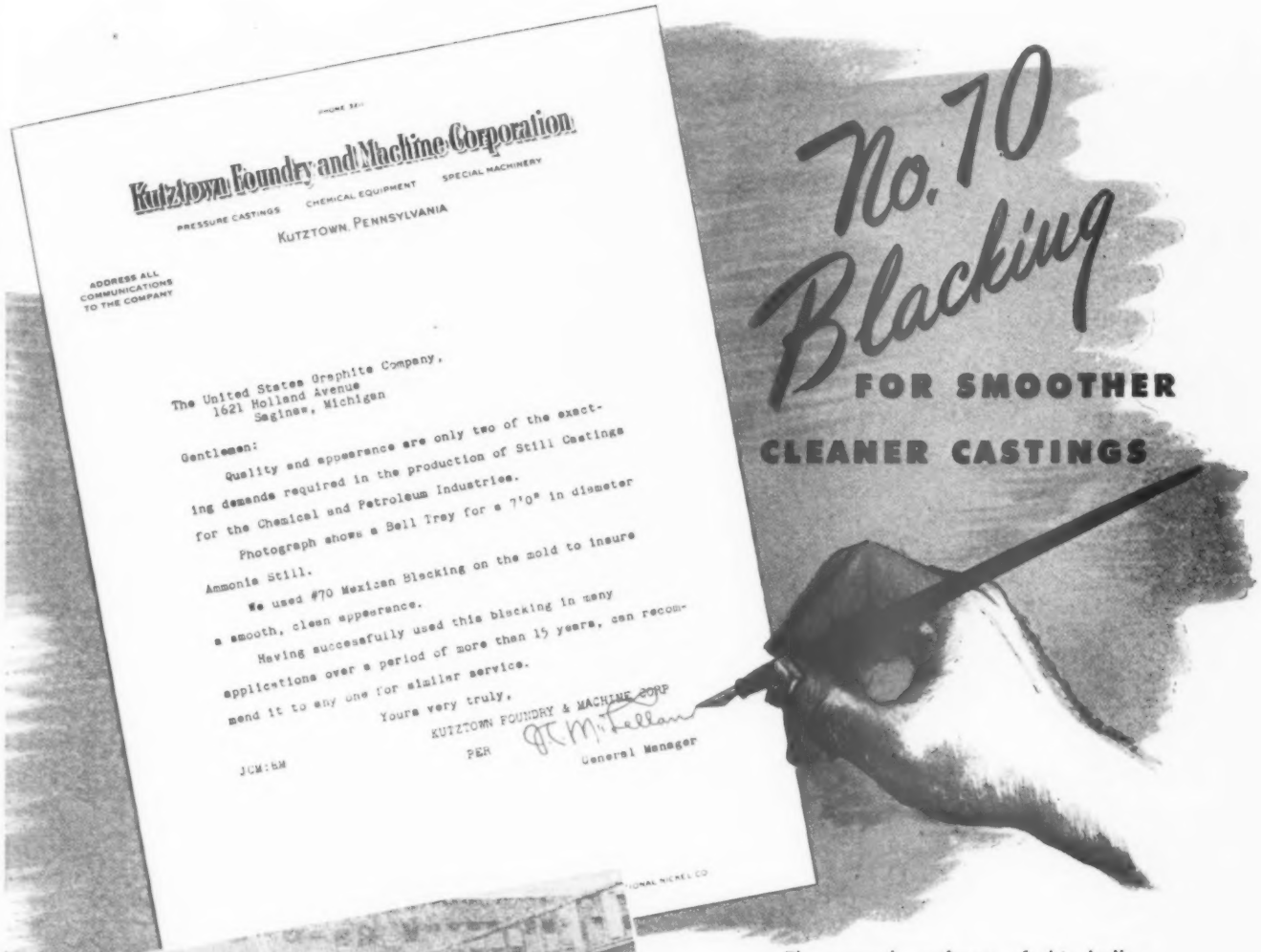
ANNUAL western Ontario meeting of the Ontario Chapter of the AFA was held Dec. 6, at the Prince Edward Hotel, Windsor. Over 100 delegates visited the plants of Walker Metal Products Ltd., Auto Specialties Mfg. Co. Ltd., Bryant Pattern & Mfg. Co. Ltd., and Ford Motor Co. of Canada Ltd., during the afternoon, on prearranged tours through these foundries.

At the dinner meeting that evening, Ralph L. Lee, General Motors Corp., Detroit, was introduced by H. M. Gregory, general manager, Walker Metal Products Ltd. J. A. Wotherspoon, chairman of the chapter, presided.

In discussing "Leadership," Mr. Lee brought out the following points: "A leader is a man who is not afraid of his job and believes that his work is important; who will tell a man what is what, for his own good; who knows most of the answers and is ready to look up those he doesn't know. A good leader is as square as a die, and never, under any circumstances, reprimands a man before another person. Leaders work not only to live, but find in work a reason for living."

Outlining fundamental characteristics of a leader, Mr. Lee said: "He should have a low voice and neat appearance; should rarely be in a hurry. He should be punctual, orderly, accurate and decent. He should be a good loser; hard to sweep off his feet; quick to come to the point; friendly with people and bal-

(*Continued on page* 149)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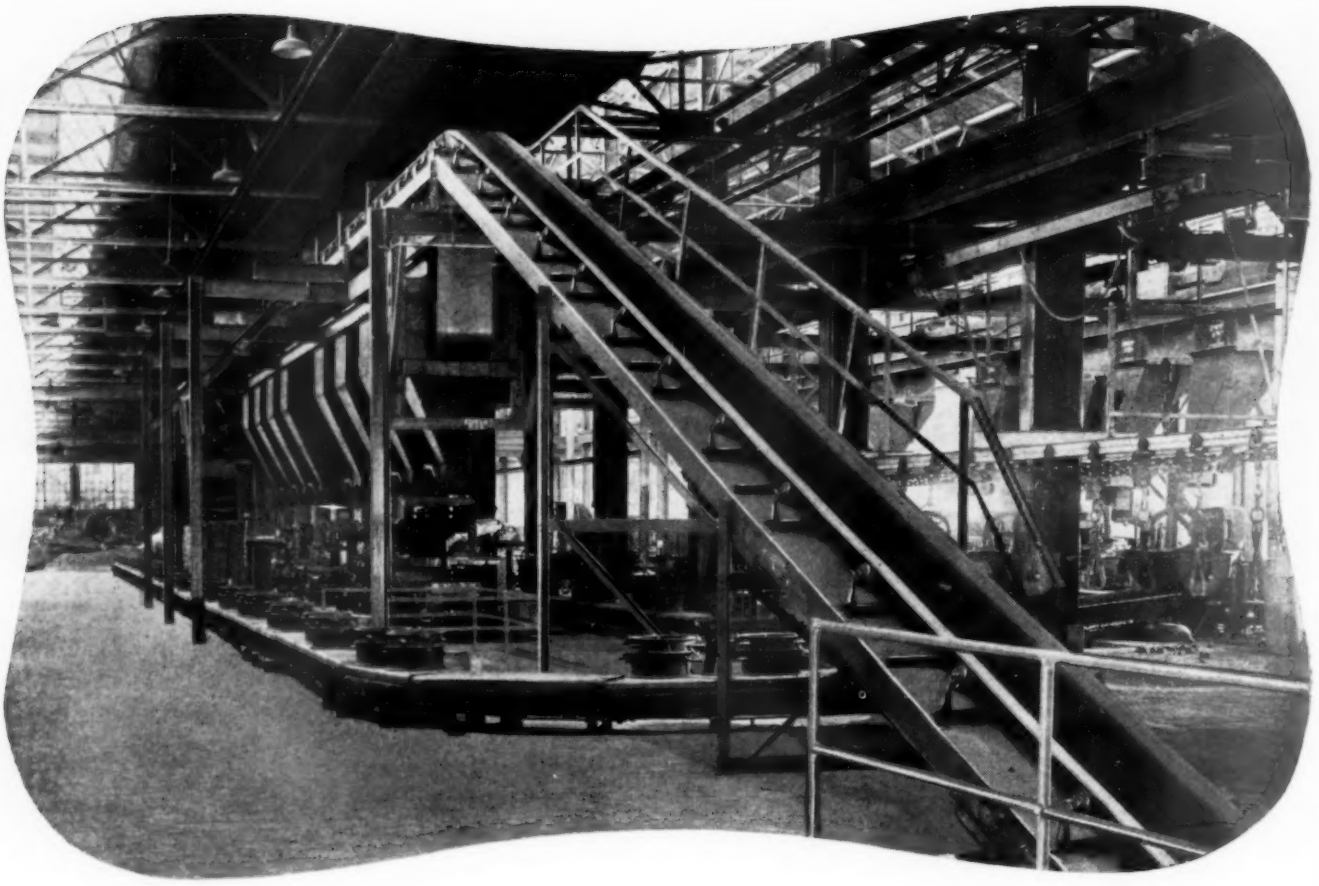

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WESTERN NEW YORK: Left—S. D. Martin clocks Arthur M. Clark as he makes cores in a time-motion study demonstration before the Western New York Chapter of the AFA, Dec. 6. Both men are with Central Foundry Division, General Motors Corp., Saginaw, Mich. In picture at right are, left to right, Elliot Jones, Lumen Bearing Co., chapter vice chairman; Mr. Matrin; Leslie C. Thellemann, Kencroft Malleable Co. Inc.; Henry Winte, Worthington Pump & Machinery Co., chapter chairman, and Mr. Clark

(*Continued from page* 146)

anced by a certain amount of self-assurance."

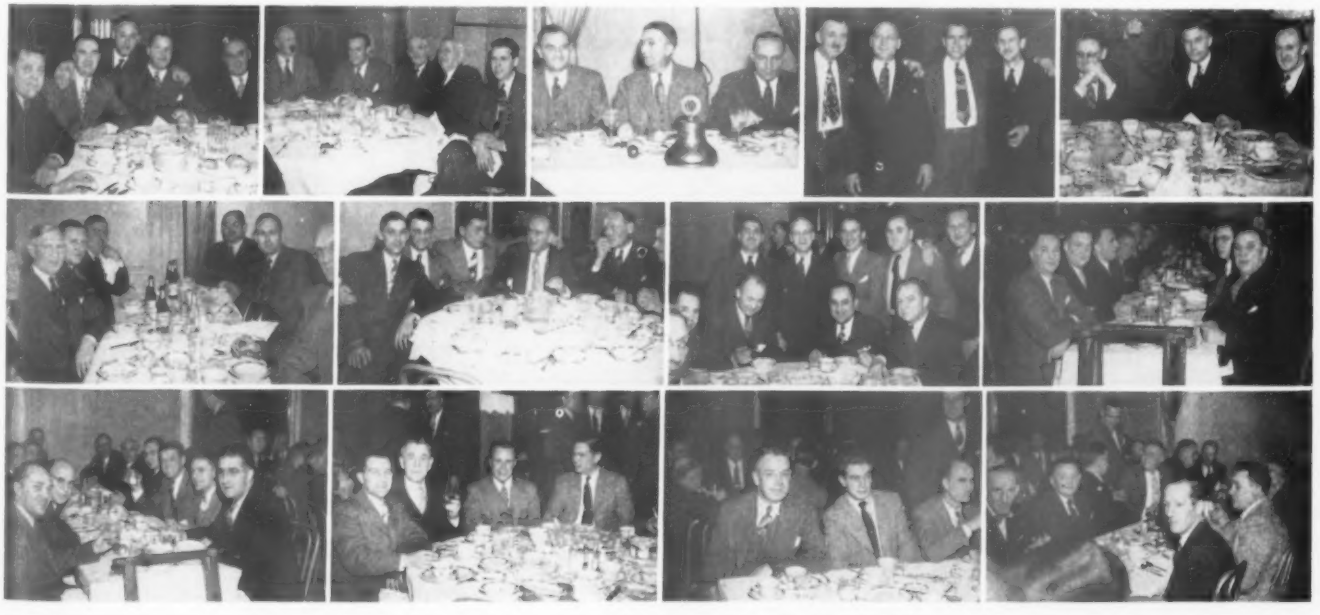
The meeting brought members from many parts of Ontario together and gave the Windsor members an opportunity to meet distant friends in the association.—*G. L. White, secretary-treasurer.*

Western New York

A PRACTICAL demonstration of motion study and better methods was presented before 120 members of the Western New York Chapter of the AFA at Hotel Tourain, Buffalo, N. Y., Dec. 6 by S. D. Martin, production manager, and Authur Clark, coreroom foreman, Central Foundry Division, General Motors Corp., Saginaw, Mich. Henry Winte, chapter chairman, presided at the meeting, with Leslie C. Thellemann, Kencroft Malleable Co. Inc., serving as technical chairman.

In his opening remarks, Mr. Martin emphasized the value of motion study to eliminate unnecessary movements and the results of such studies which lead to the adoption of better production methods. Mr. Clark demonstrated these principles as applied to coremaking on the bench. Charts, indicating body movement time in one hundred thousandths of a minute, showed that the old method of making a certain core consisted of eight movements requiring about .5 minute per box and producing 480 cores per hour.

Then changes in core bench layout were made. The telescopic legs of the bench were extended to accommodate Mr. Clark's height. Sand bin and core wire locations were altered to permit a balanced distribution of motion for both hands—formerly the right hand was doing the major portion of the work. A peening operation was omitted since jolting was all that was required. The



WISCONSIN: Some of the participants in the annual Christmas party held by Wisconsin Chapter of the AFA at Milwaukee, Dec. 13. (Photos courtesy of John Bing, A. P. Green Fire Brick Co.)

set-off was raised at a different angle to eliminate unnecessary walking.

Revised method of operation required only approximately .31 minutes per box and produced 780 cores per hour, or an increase of 62.5 per cent over production by the former method.

After this demonstration slides and motion pictures illustrating motion study principles applied to other foundry practices were shown.—*Leslie C. Thellemann, publicity chairman.*

Wisconsin

WISCONSIN Chapter of the AFA held its annual Christmas Party at the Crystal Ballroom, Hotel Schroeder, Milwaukee, Dec. 13. The intended attendance limit of 700 was exceeded by 38 which made it necessary to place some of the late comers in the large reception space between the ballroom and the banquet room.

There was no formal business at the meeting—only good food and a floor show. After dinner and before the show started, guests participated in a songfest featuring old time songs. This was not a party for foundrymen alone; some firms had purchased dozens of tickets for their department heads and others, one of the larger companies having more than 75 men present.

Committee members who planned the party were: Everett N. Carpenter, chairman; Darold W. Thiem, co-chairman; Richard F. Jordan; Kellie O. Johnson; Frank Kulka; Steven Lukacek; Paul F. Rice and C. Nelson Spidell.

Before turnout of 327, two national officers of the AFA addressed the members of the Wisconsin Chapter at its January dinner meeting on Friday, the 10th. They were S. V. Wood, national president and W. W. Maloney, secretary-treasurer. Earlier in the day, at a luncheon for fifty guests, arranged by the Wisconsin Chapter, the two officers spoke words of encouragement for the future of the foundry industry.

In their talks at the dinner meeting in the evening, Messrs. Wood and Maloney emphasized the need of younger men as key men—foremen, supervisors and department heads. Gone are the days, they said, when promotion depended entirely on the length of service of such men. If younger men have ideas as to betterment of foundry conditions, give them an ear, Wood declared, and don't pooh-pooh them because they may not have been in the foundry business as long as others, or do not have as much sand in their shoes as some who have been with the firm for many more years.

Mr. Maloney congratulated the Wisconsin Chapter on the kind of meetings which have been held by it for many years, with constantly improving quality as to discussion of subjects and speakers. The Wisconsin Chapter, he said, is probably the only one in the association which can draw more than 300 men to a meeting, as this chapter has done on numerous occasions. Among the new chapters to be added shortly, he said, was the Rocky Mountain group in Denver, and the Tri-State group in Oklahoma.

Remainder of the meeting was given over to sectional discussions by six groups. All sessions were well attended with an overflow in some, especially the one on pattern equipment. The subjects discussed and the speakers at these sessions were as follows:

Pattern Group—Subject, "Pattern Equipment for Core Blowing." Speakers, G. Krueger, O. Gleaton, and M. Raeber, all of Allis-Chalmers Mfg. Co. Malleable Iron Group—Subject, "Motion Time Analysis in the Malleable Foundry." Speaker, A. B. Segur, A. B. Segur Co. Steel Group—Subject, "Production Castings Made with Necked-down Risers." Speaker, R. T. Leisk, American Steel Foundries. Nonferrous Group—Subject, "Permanent Mold Castings." Speaker, John T. Wattry, Aluminum Castings & Engineering Co. Gray Iron Group—Subject, "Refractories in the Cupola." Speaker, Roy A. Witschey, A. P. Green Fire Brick Co., Chicago Technical Group — Subject, "Supersonic Inspection." Speaker, Robert C. Steveling, Ladish Drop Forge Co.

Announcement was made regarding the regional conference to be held by the Wisconsin Chapter, Feb. 13-14, at the Hotel Schroeder, Milwaukee, invitations for which had already been sent to all members and others interested.

(*Continued on page* 154)

Additional views of the Wisconsin Chapter Christmas party. (Photos by John Bing, A. P. Green Fire Brick Co.)

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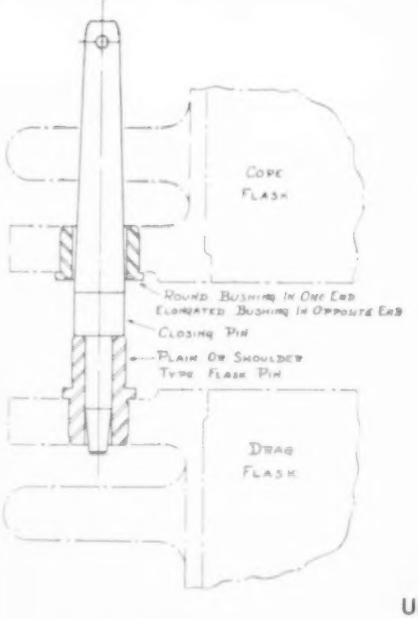

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YOUR BUSINESS, too, can achieve the same vital benefits by installing HYDRO-BLAST —faster production by speeding castings through cleaning operations: better working conditions due to elimination of dust; savings in man-hours that may easily reach a big sum. Better look into these HYDRO-BLAST benefits; costs nothing to find out —may well cost a great deal not to. Write for full information.

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FAIRBANKS-MORSE
CHICAGO PNEUMATIC TOOL
MACHINED STEEL CASTINGS COMPANY

BLAST CORPORATION

CHICAGO 47, ILLINOIS

(*Continued from page* 150)

At the noonday luncheon, president Zuege welcomed the national officers to Milwaukee, and Roy Jacobs, president of Standard Brass Foundry, Milwaukee, discussed the history of the Wisconsin Chapter and gave an outline of the foundry business in Milwaukee. He also spoke of plans for the future for the chapter and the educational work it expects to do.—*John E. Hubel.*

Metropolitan

BY ALL odds the largest and certainly one of the most successful of the Christmas parties held by the Metropolitan Chapter of the AFA took place Dec. 13 at the Essex House, Newark, N. J. More than 430 members and guests were present, enjoying excellent food and drink and excellent entertainment. It was a well-organized and well-run affair.

Harold L. Ullrich, Sacks-Barlow Foundries Inc., Newark, and chairman of the Chapter, presided. He introduced T. D. Parker, Climax Molybdenum Corp., and one-time chairman of the chapter, who, on behalf of the Metropolitan foundrymen, presented Horace A. Deane, American Brake Shoe Co., with a pen as a token of their appreciation of his services as chairman during the preceding term. Mr. Deane and Harry Lamker, Wright Aeronautical Corp., Paterson, N. J., as national directors of the AFA, were called upon to make a special bow.

Ben E. Beldin, Whitehead Bros. Co., New York, chairman of the entertainment committee, awarded numerous door prizes prior to the floor show.

With Mr. Belden, the entertainment committee was comprised of William Lawson, Springfield Facing Co., Newark, and treasurer of the committee; Ernest Miller, Bethlehem Steel Co., New York; K. A. DeLonge, International Nickel Co., New York; D. W. Talbot, Cooper Alloy Foundry Co., Hillside, N. J.; W. E. Sattler, Worthington Pump & Machinery Corp., Harrison, N. J.; and E. B. Smith, American Brake Shoe Co., Mahway, N. J.

Also D. S. Yeomans, George F. Pettinos Co., Philadelphia; Earl Morrow, Ingersoll Rand Co., Phillipsburg, N. J., George Hadzima, Robins Conveyors Inc., Passaic, N. J.; Paul N. Nydegger, Singer Mfg. Co., Elizabethport, N. J.; H. A. Robinson, Republic Steel Corp., New York; and Frank B. Eliason, Pennsylvania Foundry Supply & Sand Co., Philadelphia.—*Ben K. Price.*

METROPOLITAN: Views of the Metropolitan Chapter of the AFA Christmas Party held at the Essex House, Newark, N. J., Dec. 13. In picture at lower right are, left to right—K. A. DeLonge, International Nickel Co., New York, chapter vice president; Horace A. Deane, American Brake Shoe Co., New York, past chapter chairman and national director; and Harold L. Ullrich, Sacks-Barlow Foundries Inc., Newark, chapter chairman. (Photos courtesy Don Yeomans, George F. Pettinos Co. Inc.)

Twin City

IF THERE had been any mystery in the minds of members of the Twin City Chapter of the AFA about synthetic sands, it was dispelled at the meeting Nov. 19, when N. J. Dunbeck, Eastern Clay Products Inc., Eifort, O., talked on foundry sands in general and synthetic sands in particular.

He explained the fundamentals of foundry sands, how they should be used and how to pick the correct type of sand for each job. He elaborated on the advantages and disadvantages of natural and synthetic sands and said that natural bonded sand is better for small shops because it has a wider range and is easier to work with—it requires less equipment to keep it in proper condition.

Mechanized shops and those that have the necessary equipment to mull sand are the logical shops to use synthetic sand. Synthetic sand is more economical to use, has greater durability, better and easier control, requires less moisture, and has higher flowability and permeability.

Mr. Dunbeck discussed various clays that are used as bonds in foundry sands and ended his presentation with a general discussion in which he answered many questions about sand.—*J. W. Costello.*

Chicago

FOUR group sessions, comprising the second in the series of roundtables for te 1946-47 season, were featured by the Chicago Chapter of the AFA at its regular monthly meeting, Jan. 6, at the Chicago Bar Association. Again this type of meeting proved its popularity by attracting heavy attendance.

Chapter President L. H. Hahn, metallurgical supervisor, Sivyer Steel Casting Co., Chicago, presided at the dinner and general portions of the meeting.

"Cupola Melting Practices" was the subject of the Gray Iron division roundtable, with H. L. Campbell, metallurgical engineer, Western Foundry Co., Chicago, as the speaker. Herbert Madsen, Whiting Corp., Harvey, Ill., was chairman.

Mr. Campbell pointed out that although the cupola has been in use about 125 years, its design has remained rela-

(*Continued on page* 156)

BACKGROUND FOR SUCCESS
The quality of materials used in making steel and iron is the basis of their ability to meet today's stringent requirements.
The excellent quality of VANCORAM ferro-alloys, consistent from lot to lot, aids manufacturers in the production of steels and irons for maximum performance both in processing and in use.
Our metallurgists will be glad to cooperate with you on specific applications.
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(*Continued from page* 154)

tively unchanged. Some of the operating problems appear to arise out of its simplicity as a melting unit. For efficient operation and high-quality iron, however, certain principles must be followed. For example, the speaker emphasized, air, fuel and metal charge must be apportioned properly. Time also is an important factor, for every element of cupola operation is rated.

Advice of Mr. Campbell was that coke must be gaged according to mass of metal to be melted down—sufficient coke must be supplied to melt heavy sections. Any amount of air can be supplied to the cupola, providing compensating coke is provided. He made clear that the tuyere is not a nozzle and it has no velocity effect. A good rule for tuyere size is to make it one-fifth of the cupola area.

Lester B. Knight, president, Lester B. Knight & Associates Inc., Chicago, addressed the Malleable division roundtable on "Mechanization of Malleable Foundries." Frank Czapski, metallurgist, Chicago Malleable Castings Co., presided as chairman.

The Nonferrous division devoted its discussion to "Experiences on Permanent Molding," with L. G. Jessup, foundry technician, Federated Metals Division, American Smelting & Refining Co., Whiting, Ind., as the speaker. Oscar Blohm, secretary-treasurer, Triangle Foundry Co., was chairman.

C. F. Christopher, in charge of steelmaking practice, Continental Foundry & Machine Co., East Chicago, Ind., spoke before the Steel Division roundtable on "Mechanisms of Stress Relief in Castings." F. S. Sutherland, plant metallurgist, for the same company, presided. At a previous roundtable on Nov. 4, the speaker had discussed "Mechanism of Stress Formations in Steel."

Chicago Chapter will hold its next regular meeting at the Chicago Bar Association, Feb. 3. Plans are maturing rapidly for its annual Ladies night party on Feb. 15 at the Palmer House.—*Erle F. Ross.*

SAGINAW VALLEY—Views of the November meeting of the Saginaw Valley Chapter of the AFA. *Top,* left to right: John Smith, chapter chairman, Chevrolet Grey Iron Foundry, Saginaw, Mich.; Earl E. Woodliff, Foundry Sand Service Engineering Co., Detroit; Myron Booth, manager, Saginaw Malleable Iron Plant, Saginaw; William Mixer, foundry superintendent, Buick Motor Division, Flint, Mich.; Jim Bowen, metallurgist, Chevrolet Grey Iron Foundry. *Center,* left to right: Mr. Woodliff, speaker for the evening; Charles Scofield, Chevrolet Grey Iron Foundry, assists the magician, who entertained during the evening, by finding a $10 bill in a lemon. *Bottom,* left, John Calkins, Clio Foundry, Clio, Mich.; right, Robert Mooney, chief engineer, Central Foundry Division of General Motors, Saginaw.

Central Ohio

MEETING of the Central Ohio Chapter of the AFA, held in Columbus Nov. 25, was conducted in two sections, each taking the form of a round-table discussion. Discussion in the steel section was led by a panel consisting of William T. Bland, Floyd O. Lemmon and R. H. Frank. Such casting defects as cracks, hot tears, gas porosity, pinhole porosity and surface checking or cracking on large flat areas of heavy castings came up for discussion.

The last-named defect is not too common and is sometimes referred to as "chicken wire" cracks because of its appearance. One of the members reported that he eliminated the defects in the rather unorthodox manner of using hot cores directly from the core oven at 500 F.

The discussion in the gray iron section was led by D. E. Krause. Some of the causes for defective castings were reviewed and discussed.

Bruce Simpson, president, National Engineering Co., Chicago, addressed the Central Ohio Chapter, Dec. 16, on the subject "The History of the Foundry Industry" and illustrated his talk with slides showing the progress of metal casting.

It was rather amazing to learn of the large and intricate castings made at a time when there was very little scientific knowledge of the operations. Many of the castings preserved for centuries were works of art and compare surprisingly well with similar types of castings made at the present time. One can't help but admire the perseverance some of these old foundrymen must have exercised in overcoming many of the obstacles and heartbreaks in following their practice.

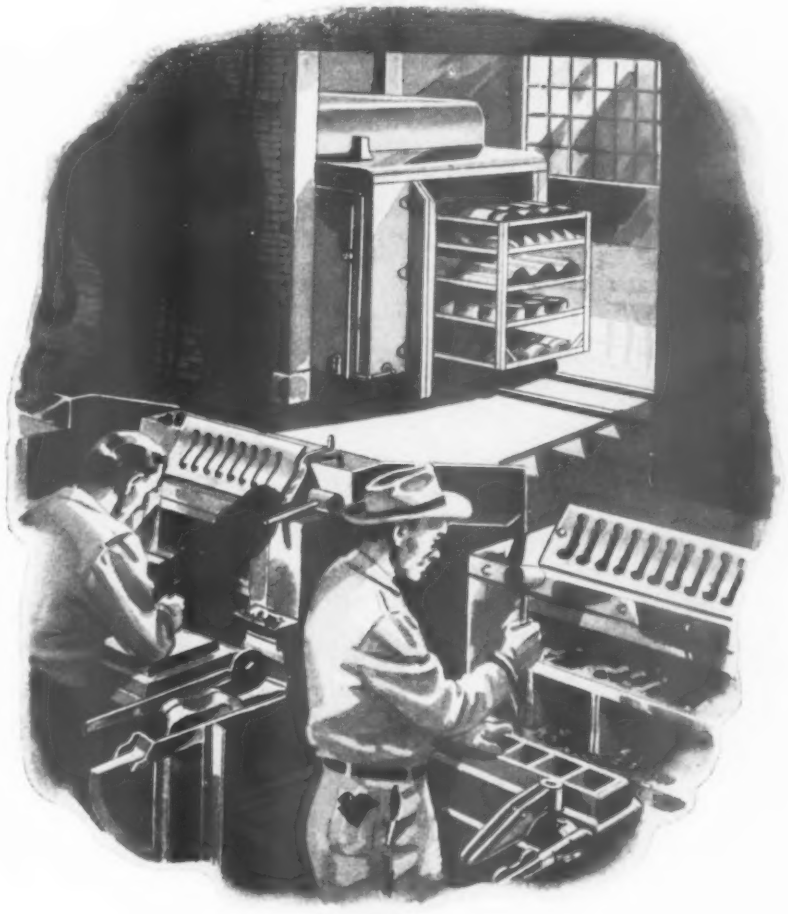
A coffee talk by Irvin Johnson, radio announcer at WBNS, preceded Mr. Simpson's address. Mr. Johnson gave an interesting account of some of his ex-

(*Continued on page* 158)

VOLCLAY BENTONITE

NEWS LETTER No. 17

REPORTING NEWS AND DEVELOPMENTS IN THE FOUNDRY USE OF BENTONITE



BENTONITE IN CORES

1. Bentonite gives green strength to cores, which reduces sag and breakage expense. Either Volclay or Panther Creek may be used.
2. Volclay Bentonite gives high dry strength to cores to prevent cutting, as well as high hot strength.
3. Panther Creek Bentonite gives low dry strength and low hot strength.
4. Bentonite doesn't create gas.
5. Bentonite grants higher green strength with little sacrifice to permeability.
6. Better permeability enables finer sands to be used when bentonite replaces such fines as molding sand, fire clay bond, etc.
7. Bentonite prevents migration of cereal to the surface of the core.
8. Enables mixture to be worked faster.
9. Less bedding up with bentonite.
10. Less wires and rods with bentonite.
11. Elimination of driers when bentonite is used for certain stand-up cores.
12. Keeps a cleaner core box.

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Producers of Volclay and Panther Creek Bentonite

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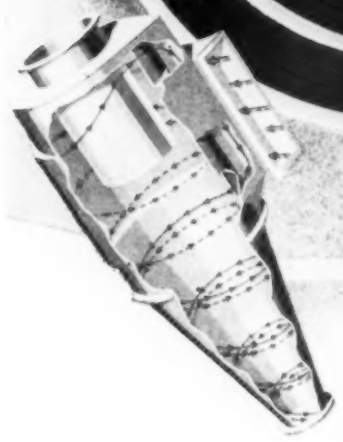

Only Buell Dust Recovery equipment affords these six extra-efficiency features: 1—The "Shave-Off"; 2—Large Diameters; 3—Extra-Sturdy Construction; 4—Correct Hopper Design; 5—Slit-Duct Manifolding; 6—Inner Welds Ground Smooth.

Write for Buell's book—"The van Tongeren System of Industrial Dust Recovery".

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van Tongeren DUST RECOVERY SYSTEMS
DESIGNED TO DO A JOB, NOT JUST TO MEET A "SPEC"

(*Continued from page* 156)

periences as an announcer.

In keeping with the Christmas spirit, door prizes were awarded and refreshments served.

The technical meeting planned for Feb. 27 will be held at the Chittenden Hotel, Columbus. Two round-table discussions will be held; one for the steel section will be led by Jack Caine, Sawbrook Steel Castings Co., Cincinnati, whose topic will be "Scabbing and Buckling." The iron section will be led by Elmer Zirzow, National Malleable & Steel Castings Co., Cleveland, whose topic will be "Sands for Molds and Cores."—*D. E. Krause, reporter.*

Northern California

THREE speakers and special entertainment marked the Dec. 9 meeting of the Northern California Chapter of the AFA at the Engineers Club. The first speaker introduced by George McDonald, program chairman, was Don Caudron, Pacific Brass Foundry, who talked on "Melting Practices in Brass and Bronze." Mr. Caudron pointed out that sound castings of good quality depend on suitable metal and proper attention to furnace design, use of fuel (oil or natural gas principally, in this area) and condition of melt when ready to pour.

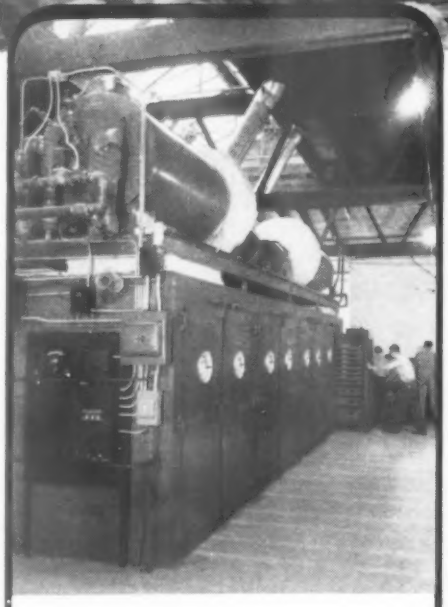
He went on to say that combustion products affect molten metal, and allowance must be made for variation between oil and gas products. Hydrogen and water are great enemies of good metal. Slight excess of gas prevents formation of oxides and makes for cleaner furnaces, according to Mr. Caudron.

He described the practice of blowing compressed air through the molten metal as a final treatment before pouring, citing his own favorable results, and gave technical references showing that this practice improves pressure tightness and mechanical properties of bronze sand castings.

Second speaker was Ray Wilson whose subject was "The Yardstick for Foundry Production of Steel." He used several large charts to illustrate his talk and outline his own studies and findings. Starting with the premise "It is management's responsibility to operate machinery and manpower efficiently," he listed the operations performed, their logical sequence, the plant layout, traced flow of work (as done originally) then after certain changes, and what they should be under ideal conditions. To assist in the study of proper location of equipment, Mr. Wilson recommended the use of templates of the equipment cut to scale so that the most efficient location could be

(*Continued on page* 160)

Proper Layout with DESPATCH Ovens Achieve New PRODUCTION RECORDS for The Coremakers Co. Chicago



CORES ARE LOADED INTO OVEN from this side, are removed through similar doors on opposite side. Allows continuous baking operation and easy straight-line handling.

Two high-capacity 1,000,000 BTU Despatch heaters assure fast, uniform baking of large loads. Forced exhaust removes fumes. Automatic heat controls and safety systems.

Allows Continuous Baking, 2500 lbs. per hour

For efficient coremaking that really pays dividends, here is an example at the Coremakers Company: **A core-room layout planned around fast-baking DESPATCH Ovens.**

The Coremakers Co. *make special-formula cores for aluminum, brass, iron and steel. After baking, cleaning and inspection, cores are packed in cartons, shipped by truck.*

In their ultra-modern plant, which supplies quality cores of all types to foundries in several states, The Coremakers Co. (Chicago), use DESPATCH Ovens, with great success. Their two double-compartment ovens provide these advantages:

- **Bakes 20,000 lbs. in 8 hours.**
- **Accommodates large and small cores at same time.**
- **Allows easy, convenient handling.**
- **Saves floorspace; uses only 5½′ x 39′.**
- **Improves working conditions; keeps labor turnover down.**

The ovens are designed to accommodate 8 adjustable-shelved trucks at the same time—two in each double compartment. Each section of the oven is a semi-independent baking unit with its own separate doors, *one at each end.*

Cores, from 1 oz. to 300 lbs. in weight, are arranged on trucks according to baking-size, then baked at 450° F. When baked, each load is at once withdrawn from oven through opposite door, leaving room for prompt loading of a new truck-load.

This permits continuous baking of both large and small cores . . . avoids "backtracking" . . . saves labor, and assures ample production of correctly-baked cores.

Your foundry can get similar advantages with a DESPATCH Oven! Let our engineers estimate savings you'll make with a new batch or continuous type oven. All types . . . all sizes . . . all fuels.

Use Despatch Coremaster Ovens for Coremakers

DESPATCH OVEN COMPANY
615 S. E. 8th St., Minneapolis 14, Minn.

WRITE TODAY FOR BULLETINS 30-31-32

DESPATCH OVEN COMPANY

Offices in All Principal Cities

(*Continued from page* 158)

chosen with due regard to noninterference with other operations, use of least expensive floor space, efficient handling and flow of material into and out of the plant.

During the discussion that followed Jim Francis, Vulcan Foundry Co., complimented the speaker on his approach to the problem which all foundries have in greater or lesser degree. George McDonald, Macauley Foundry, asked what progress was being made in carrying out the plan. Bill Clark, Enterprise Engine & Foundry Co., discussed the economy of making the changes found desirable after such a study, and Ed Brumley, Brumley-Donaldson Co., pointed out that the multiple handling of materials, particularly sand, is a perplexing problem in foundries and could stand close scrutiny.

Andy Ondreyco, Vulcan Foundry Co., third speaker, talked on "Metallurgical Development of Gray Iron." He stated that through progress in the science of metallography, improvement in the quality and strength of gray iron has made great strides the past 25 years. Contributing factors have been experiments with alloying, photomicrographic technique in the study of metal structures as affected by alloying, melting and heat treatment. Of great importance are the close control of melting, makeup of charges, and proper pouring temperatures and other related practices.

He showed some interesting photomicrographic slides of several types of iron, illustrating points made during his talk. Attention was then directed to a display of castings made under close metallurgical control and their properties described in terms of tensile strength and other physical characteristics.

Committee reports brought out the fact that the chapter is going to give important support to the Oakland Junior Chamber of Commerce Scout-O-Rama; the Central Trades School, Oakland, is installing a foundry; the sand committee is preparing a special program at the Western Metals Congress in March and that arrangements for the technical program to be presented at this congress are progressing.

Entertainment, arranged by Dan Henry, included Bill Sweeney, Chicago magician, supplemented by Pete Valentine, Henry Sinigiani and Jay Snyder. —*Charles R. Marshall, publicity chairman.*

CENTRAL ILLINOIS: Views at the Christmas party of Central Illinois Chapter, AFA. Bottom row, left to right, shows: A. V. Martens, vice chairman; G. H. Rockwell, secretary-treasurer; F. W. Shipley and Adolph Klawitter, directors. (Photos courtesy of Caterpillar Tractor Co.)

St. Louis

APPROXIMATELY 400 members and guests of the St. Louis District Chapter of the AFA gathered in gay holiday mood at the DeSoto Hotel, St. Louis, Dec. 12, for the chapter's December party.

Jess F. Donnell, entertainment committee chairman, lined up a fine dinner and show and after the entertainment small groups of the men present got together for card games.—*John W. Kelin.*

Central Illinois

CENTRAL Illinois Chapter of the AFA held its first Christmas party at the American Legion Home, Peoria, Ill., Dec. 15. The party was held on Sunday so that members who work second and third shifts in the different foundries could attend. More than 250 attended the party.

The entertainment committee, directed by Vice Chairman T. V. Martens, Pekin Foundry & Mfg. Co., Pekin, Ill., provided an excellent turkey dinner, fine vaudeville show and door prizes. The party was so successful that chapter officers decided to make it an annual affair.

Regular monthly meeting of the Central Illinois Chapter was held Jan. 6, at the Jefferson Hotel, Peoria, with H. C. Winte, of the Buffalo works, Worthington Pump & Machinery Corp., Harrison, N. J., as guest speaker. Mr. Winte, whose subject was "Gates and Risers," outlined foundry technique in production of sound castings.

M. J. Gregory, retired former manager of the foundry division, Caterpillar Tractor Co., Peoria, was introduced as an

(*Continued on page* 162)

BETTER SURE THAN SORRY

According to olden legend Icarus flew too near the sun, only to spin in when his wings failed to stand the stress at high temperature. Here was an early case of serious trouble due to misplaced confidence in materials.

There are many applications for cast steel nowadays where creep strength (the ability of steel to keep working when the heat is on) makes a lot of difference. Molybdenum cast steels, noted for their creep strength, are economical preventives of high temperature trouble.

Icarus had no accurate data on materials to guide him. A wealth of tested, practical facts about Molybdenum cast steels for elevated temperature service is available on request for today's engineers and designers.

MOLYBDIC OXIDE—BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"
CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

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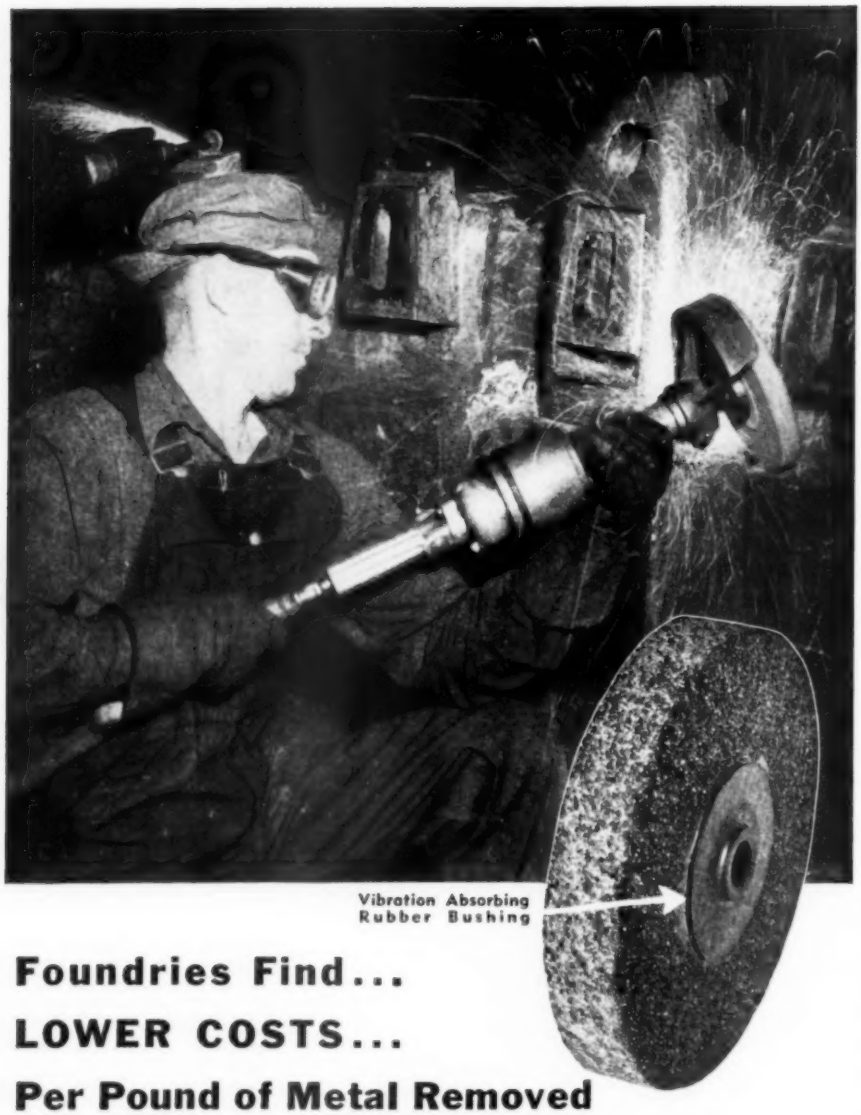

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Manhattan engineers have found a way, thru special composition of bonding and improved resins, to reduce glazing and increase the working effectiveness—the "life of the bite"—of Manhattan Abrasive Wheels.

MANHATTAN V. D. B. WHEELS

. . . with the new and evolutionary Vibration Dampener Bushing of resilient rubber. (U. S. Patent No. 2,187,350) No "chatter" or "jumping." Wheels last longer. No strain or vibration on man or machine. Hands and arms are free to do accurate work without fatigue . . . LOWER COSTS ALL AROUND.

For your answer to problems of economy and production write or phone

ABRASIVE WHEEL DEPARTMENT

RAYBESTOS-MANHATTAN INC.

Keep Ahead with Manhattan

MANHATTAN RUBBER DIVISION • PASSAIC, NEW JERSEY

(*Continued from page* 160)

honor guest by Chairman Z. Madacey, superintendent of the Caterpillar foundry.

Frank Shipley, program committee chairman, announced that C. E. Bales, vice president, Ironton Fire Brick Co., Ironton O., would speak on "Refractories," at the meeting in February, and Vic Crosby, Climax Molybdenum Co., Detroit, would be speaker at the April meeting, to be held jointly with American Society for Metals.—*G. H. Rockwell, secretary-treasurer.*

New England

OVER one hundred members and guests attended the Dec. 11 meeting of the New England Foundrymen's Association at the Engineer's Club, Boston.

The meeting took the form of a round-table discussion under the supervision of the following "board of experts": R. F. Harrington, Hunt-Spiller Mfg. Corp., Boston, board chairman; Walter M. Saunders, Providence, R. I.; Henry Sternberg, foundry superintendent, Draper Corp., Hopedale, Mass.; Charles Bailey, foundry superintendent, Patch-Wegner Co. Inc., Rutland Vt.; and J. B. Stazinski, foundry superintendent, General Electric Co., Lynn, Mass.

Each member of the board presented a brief talk on a foundry problem, and by the number of questions put to them from the floor considerable interest was aroused. Many interesting problems came up for discussion and a few difficult castings were exhibited by some of those present.

Chairman Harrington, who was forced at times to bring the gathering under control when a heated discussion was involved, succeeded in making a most interesting evening of the affair.

Annual meeting of the association was held Jan. 8, at the Parker House, Boston. Chairman Charles A. Reed, Ray Hunter, and Harry Impey had charge of arrangements and dinner was served to over 300 members and guests, followed by a fine program of entertainment. The following officers were elected to serve for the current year:

President, David L. Parker, General Electric Co., Lynn, Mass.; vice president, Arthur F. Dockery, H & B American Machine Co., Pawtucket, R. I.; treasurer, Arthur W. Gibby, East Boston, Mass.; secretary, Ernest F. Stockwell, Barbour-Stockwell Co., Cambridge, Mass. Members of the executive committee include: A. F. Dockery; Frederick M. Fitzgerald, Draper Corp., Hopedale, Mass.; Thomas I. Curtin, Waltham Foundry Co., Waltham, Mass.; Robert C. Walker, Whitin Machine Works, Whitinsville, Mass.; Frank R. Elliot, Westinghouse Electric

(*Continued on page* 164)

THE Redford CORE BLOWER

CARTRIDGE BENCH TYPE

Users report remarkable increases in quality and quantity of production.

When making cores from horizontally split boxes, the work of placing driers and drawing the box is done on the base of the machine

HUNDREDS OF FOUNDRIES ALL OVER THE WORLD ARE USING REDFORDS AS AN EFFICIENT LOW COST MEANS OF PRODUCING SMALL INTRICATE CORES

WRITE FOR

complete details and new booklet.

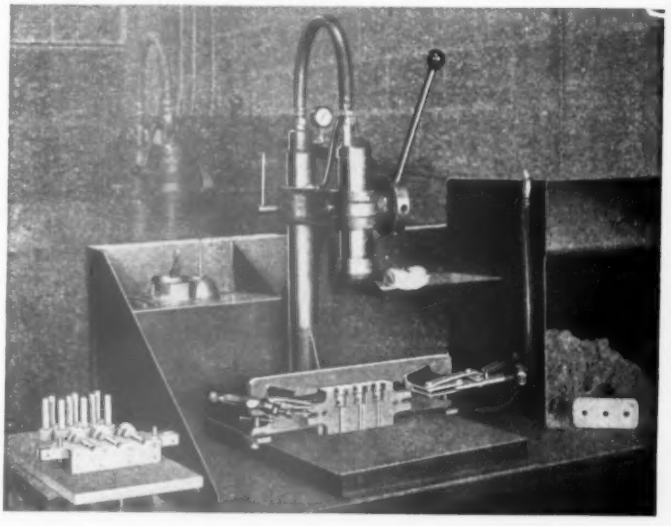
FILLS NEED FOR SIMPLE, FLEXIBLE CORE BLOWER

The New *Redford Bench Core Blower* has met with enthusiastic acceptance by foundrymen because it supplies an important need in the foundry for an efficient, low-cost method of blowing small, intricate cores. It requires no large volume of air and readily lends itself to handling a variety of core boxes. In fact, they tell us that it is the ideal method of making cores in single or gang boxes requiring a maximum of 2 lbs. of sand.

SAND CARTRIDGES AVAILABLE IN 9 STANDARD SIZES

Blower comes complete, ready to use. Each blower provided with one Size "C" sand cartridge which is adaptable to a large range of core boxes. Cartridges are available in eight additional standard sizes and special sizes furnished where needed.

WE HAVE THE "KNOW HOW" AND WILL ASSIST YOU IN SOLVING YOUR CORE BLOWING PROBLEMS



The Core Box Clamping Attachment is used when blowing split core boxes vertically (on end). It is quickly adjustable to permit use of different size core boxes. Changeover requires only a few minutes

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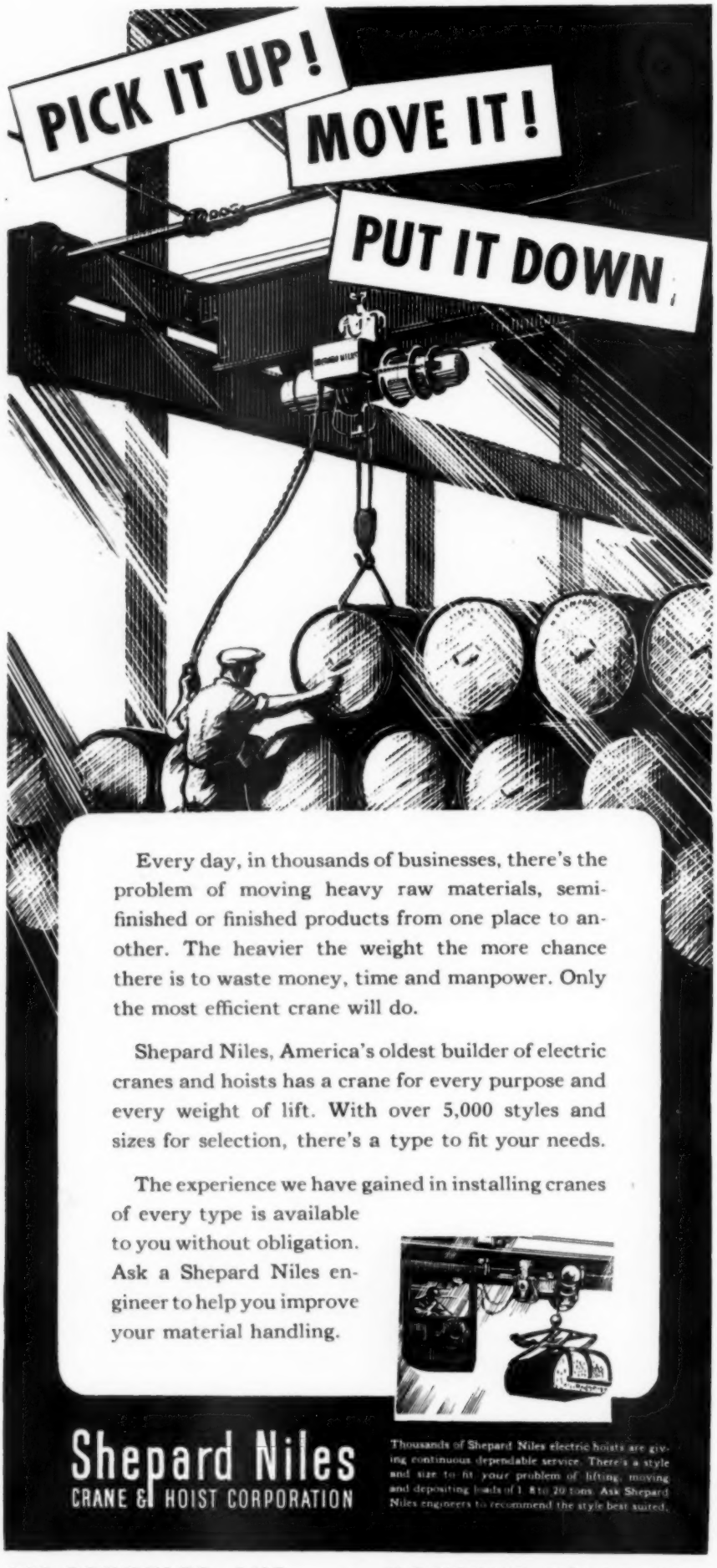
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MOVE IT!
PUT IT DOWN!
Every day, in thousands of businesses, there's the problem of moving heavy raw materials, semi-finished or finished products from one place to another. The heavier the weight the more chance there is to waste money, time and manpower. Only the most efficient crane will do.
Shepard Niles, America's oldest builder of electric cranes and hoists has a crane for every purpose and every weight of lift. With over 5,000 styles and sizes for selection, there's a type to fit your needs.
The experience we have gained in installing cranes of every type is available to you without obligation. Ask a Shepard Niles engineer to help you improve your material handling.
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CRANE & HOIST CORPORATION
Thousands of Shepard Niles electric hoists are giving continuous dependable service. There's a style and size to fit your problem of lifting, moving and depositing loads of 1/8 to 20 tons. Ask Shepard Niles engineers to recommend the style best suited.
360 SCHUYLER AVE. • MONTOUR FALLS, N. Y.

(*Continued from page* 162)

Corp., Springfield, Mass., and Charles A. Reed, Rogers-Brown-Lavino Co.

Seventh New England Foundry Conference will be held March 28 and 29 at the Massachusetts Institute of Technology. The sessions are to be arranged with a special appeal to management and technical men, on the first day. The following day fundamental foundry subjects including sand, melting and casting defects will be covered. Round-table meetings and discussion on nonferrous castings are under consideration.—*Merton A. Hosmer.*

Chesapeake

FRANK O'CONNOR, American Saw Mill Co., Hackettstown, N. J., addressed members of the Chesapeake Chapter of the AFA at their November meeting on the subject, "Practical Methods in the Production of Brass and Bronze Castings."

In his opening remarks, Mr. O'Connor emphasized that cost is established on the foundry floor. If trained supervision familiar with each operation, would analyze thoroughly any defective work, quality of castings with a minimum of scrap would follow.

When melting red or yellow brass a clean, dry furnace, crucible and ladle are prerequisite. A log of the melting operation should be kept for subsequent analysis. Melting a clean charge, with an oxidizing flame, should be done as quickly as possible to prevent gas absorption, according to Mr. O'Connor. The metal should not be allowed to soak after the completion of melting, as this causes porosity.

With reference to preparing core sand, he stated that the best practice is to begin with dry sand for accurate moisture control. The binder producing the least gas should be used. Hard ramming and the use of too many reinforcing bars will cause blowing. He concluded with the statement that supervision should follow through each operation, co-operating with other foremen and co-ordinating the data for the production of quality castings.—*J. Arthur Reese, chapter recorder.*

Central Indiana

MEMBERS of the Central Indiana Chapter of the AFA heard Charles B. Schureman, consultant, F. E. Schundler Co., discuss foundry sands at their meeting in the Antlers Hotel, Indianapolis, Dec. 2.

In his talk Mr. Schureman emphasized the fact that a good molding sand should be sub-angular in shape and vary in grain size. The choice of molding sands to be used is determined by the size, shape

(*Continued on page* 166)

TWO ESSENTIALS FOR GOOD ALUMINUM CASTINGS

First—start with Alcoa Aluminum Pig and Ingots. They're uniform, sound, and true to specifications. Better to start with.

Second—be sure that your patterns are properly designed for use in casting aluminum. And be sure to follow correct melting and pouring procedures. The booklet "Casting Alcoa Alloys" can be of help to you and your men. Available March 1st.

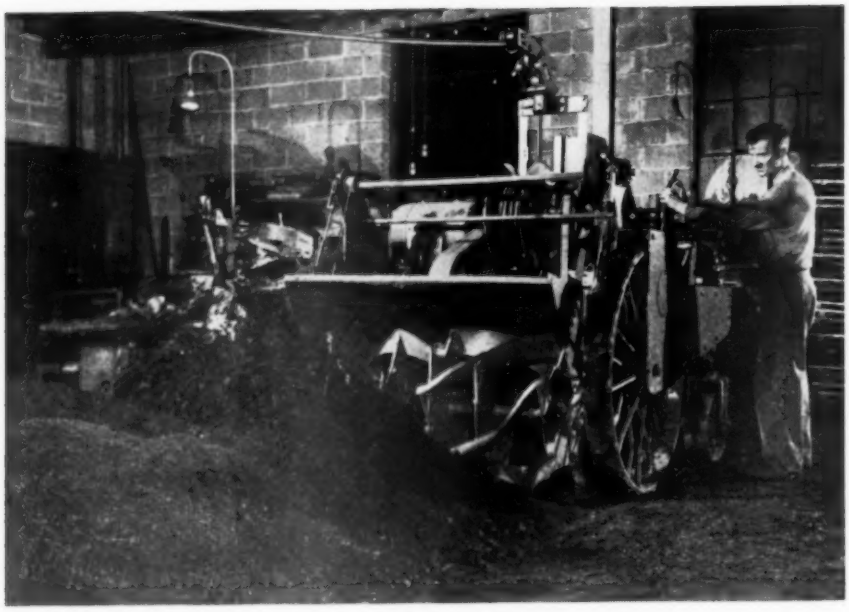
And if you need additional advice and assistance, our castings engineers and our 59 years of aluminum know-how are at your service. ALUMINUM COMPANY OF AMERICA, 1823 Gulf Building, Pittsburgh 19, Pa. Sales offices in leading cities.

MORE people want MORE aluminum for MORE uses than ever

ALCOA FIRST IN **ALUMINUM**

ALCOA ALUMINUM

IN EVERY COMMERCIAL FORM



SANDCUTTER saves 4 ways

Mr. Stanley J. Sitarz, Gen. Mgr. of the Prospect Foundry Co., Minneapolis has some good reasons for being "very happy to own an American Sandcutter." He found that it solved a serious shakeout gang problem and effected savings in his plant 4 ways!

4 men released for other work

"Before getting a Sandcutter, it took two men 8 hours a day on 16 floors to condition the sand, and five others to shakeout and floor it up. Since last July three men are doing our shakeout work, and the other 4 men we put on the day crew."

$45.00 cash savings each day

"We feel we are saving approximately $45.00 each day and making it much easier for the men since installing the Sandcutter."

Labor problem solved

". . . our labor turnover before installing the Sandcutter was 57 men in one year's time, and since last July, 1946 when we received the Sandcutter, we haven't lost a man."

More thoroughly mixed sand

"Each heap of sand in our foundry is cut 3 times, and 16 heaps of sand take one man 1 hour and 10 minutes. Our floors are 40 feet long."

American WHEELABRATOR & EQUIPMENT CORP.
(FORMERLY AMERICAN FOUNDRY EQUIPMENT CO.)
505 S. Byrkit St. Mishawaka, Indiana

Sandcutters

(*Continued from page* 164)

and desired finish of the casting to be made.

The proper bonding materials must be used in the sand. According to Mr. Schureman, kaolinite, western montmorillonite or bentonite, southern montmorillonite or bentonite, may be used alone or blended. Seacoal, if used must be of the correct fineness.

Mr. Schureman stated that when mixing sand, it and approximately one-half the water should be placed in the mixer, then the bond, seacoal and other additives, finally the remaining half of the water. If this mixing sequence is followed, the sand will be of a fairly consistent appearance and "feel" throughout the day. Foundry sand measuring devices should be checked constantly to insure correct mixes.

In conclusion, Mr. Schureman described a casting which could be used by every foundry to check the sand it is using. His talk was followed by a discussion period.

Paul Faulk, coreroom foreman, Electric Steel Castings Co., Indianapolis, served as technical chairman.—*Jack W. Giddens.*

Canton

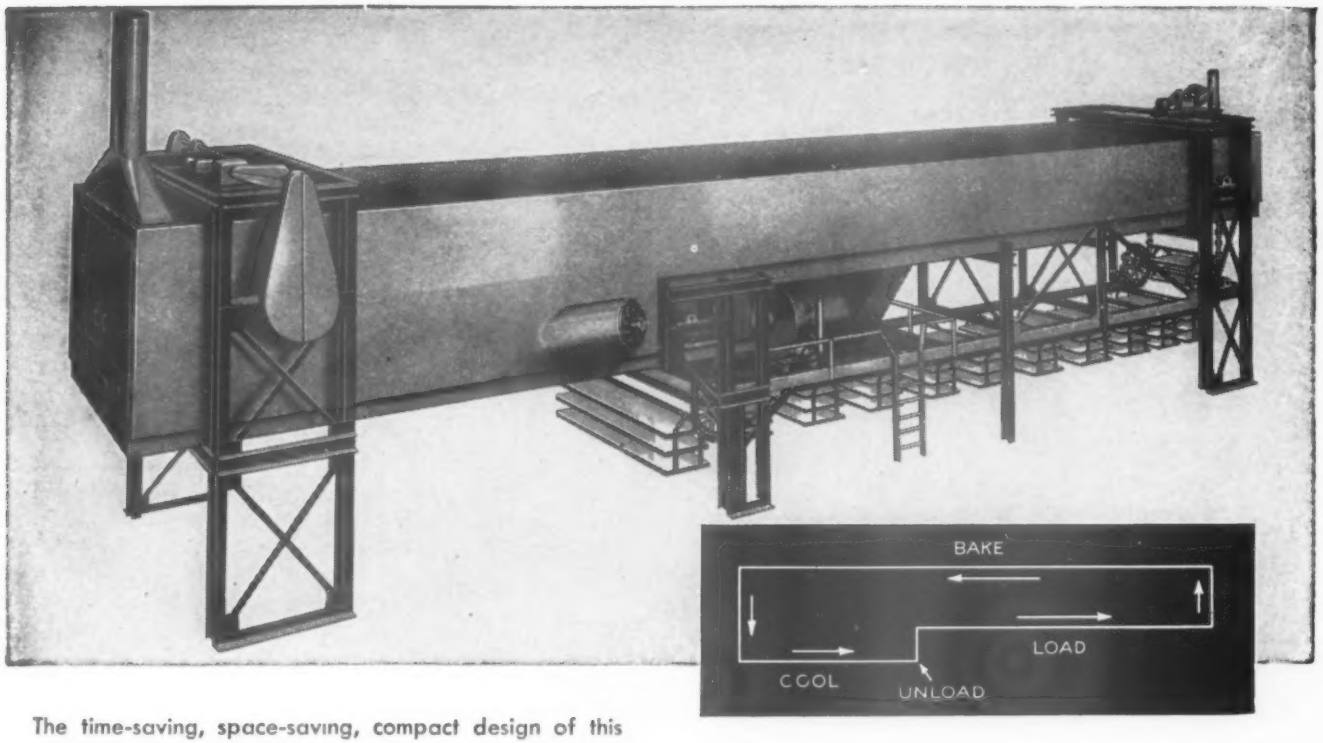
ABOUT 80 members and guests of the Canton District Chapter of the AFA heard Fred G. Sefing, International Nickel Co., discuss "Recent Developments in the Production of Sound Castings" in an illustrated talk at Yant's Cottage, Canton, O., Dec. 12.

Outstanding among these new developments is the production of pressure within a blind riser by a delayed action charge which sets up pressure at a predetermined time after the mold has been poured, forcing the molten metal to fill voids and insure soundness. However, according to Mr. Sefing, this practice is still in the experimental stage. He also mentioned the use of insulating material at cold spots in castings as a method of eliminating freeze-ups in castings where heavy sections are connected to thin ones.

Mr. Sefing said that several small details which are sometimes overlooked can account for many faulty castings. Directional solidification should always be kept in mind when placing gates and risers, and in designing castings. Shrink cavities can be eliminated by making certain the metal will solidify progressively and each adjacent section of liquid metal feed up to the risers. As temperature gradient is achieved the more nearly perfect will be the yield of sound castings.

Furthermore, according to Mr. Sefing,

(*Concluded on page* 168)



The time-saving, space-saving, compact design of this new Horizontal Core Oven is characteristic of Young Brothers' Engineering. Into it went the skill and confidence of many years of experience . . . also a thorough knowledge of the job to be done and the production problems involved.

This new core oven can be installed in practically any building without making any major structural changes.

The coremakers are located right next to the oven so that they can load the cores directly on the moving racks thus eliminating the necessity of transporting them on hand trucks or a conveyor from the core room. The location of the coremakers, at the oven, also saves core room space.

The size of the loading racks can be varied and the shelves can be adjusted to accommodate cores of many sizes and shapes.

Besides allowing for the removal of exhaust gases at the point of greatest concentration, the new oven design provides an effective cooling zone for the cores and assures comfortable working conditions for the coremakers.

This New Horizontal Core Oven is Young Brothers' answer to the demand for better core baking equipment. It is YOUR answer to the need for lower production costs and higher operating efficiency.

New HORIZONTAL CORE OVEN . . . . . offers many cost saving advantages!

MEMBER FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION, INC.

YOUNG BROTHERS COMPANY

6508 MACK AVENUE DETROIT 7, MICHIGAN

YBCo ESTABLISHED IN 1896

HERE'S *Real* WEARING EASE
WITH APPROVED PROTECTION
FOR THE *SANDBLASTER!*

The New
M·S·A
BLASTFOE ABRASIVE HELMET

U. S. BUREAU OF MINES-*APPROVED*

This new Helmet features lightweight construction (weighs less than 4½ lbs.)—durable, resilient hood—rigid aluminum headpiece—comfortable suspended-hammock head gear—bump-proof flow control valve—large area, screen protected window permitting wide angle of vision. The loose-fitting positive pressure design of the M.S.A. Blastfoe Abrasive Helmet brings new comfort to the foundry shot or sand-blast operator, and its many practical features will be best appreciated under arduous service conditions. Write for the detailed story in descriptive Bulletin No. CS-22!

MINE SAFETY APPLIANCES COMPANY
Braddock, Thomas and Meade Streets · Pittsburgh 8, Pa.
District Representatives in Principal Cities
In Canada: MINE SAFETY APPLIANCES COMPANY OF CANADA LIMITED, TORONTO
MONTREAL · VANCOUVER · CALGARY · WINNIPEG · NEW GLASGOW, N. S.

(*Concluded from page 166*)

hydrostatic pressures in risers can be used to overcome gas pressures in the mold. Gating and design of the casting should be arranged to insure flow of hot metal as directly as possible to thinner sections to avoid cooling of metal before it reaches these sections.

Chairman I. M. Emery, Massillon Steel Castings Co., Massillon, O., presided at a brief business meeting which preceded Mr. Sefing's talk.—*Nils E. Moore, reporter.*

Saginaw Valley

ROUND-TABLE discussions covering steel, light metals and casting inspection comprised the Dec. 5 meeting of the Saginaw Valley Chapter of the AFA at Fischer's Hotel, Frankenmuth, Mich.

After-dinner speaker C. W. Bonbright, president, General Foundry & Mfg. Co., Flint, Mich., put the 171 foundrymen present in a jovial mood with his humorous definitions of foundry terms.

G. Vennerholm, Ford Motor Co., Dearborn, Mich., addressed the steel session on "Measurement of Temperatures of Molten Steel." He dealt mostly with the details of the radiation and thermocouple types of pyrometers equipped with recording instruments. A lively discussion followed the talk.

W. L. Bean, Continental Aviation & Engineering Corp., Detroit, spoke to the light metals groups on "Simplification of Light Metal Casting Design and Its Effect on Serviceability." Emphasis was placed on use of the correct metal for the application, and upon design improvements to reduce stress concentrations. Samples were displayed to illustrate features of design which affect service of the part.

Herman Case, Buick Motor Division, led the discussion of casting inspection, drawing upon his 30-years' inspection experience to conduct an interesting session.

An honored guest of the evening was James H. Smith, general manager, Central Foundry Division, General Motors Corp., and an AFA national director.—*J. L. Clark, reporter.*

Peninsular Expands

Research facilities at Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit, will be greatly increased by additional building space and equipment recently purchased. The new laboratory will be a miniature plant of its own with special facilities for increased study of all phases of grinding, from raw material to finished wheels in actual use.

A-O

Safety Goggles Safeguard the Eyes of Industry • Reduce Production Costs

and

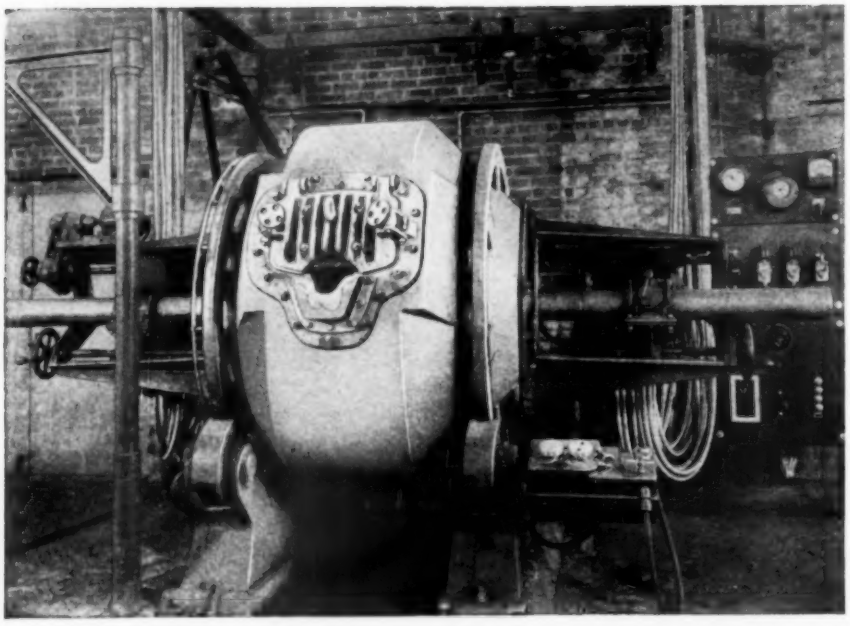
AO Safety Clothing Protects the Worker from Head to Foot

Every item in the complete AO Safety Line has been planned to provide maximum protection with the greatest possible comfort. This careful designing contributes materially to faster production and lower costs.

AO's Safety Line includes safety goggles of every type; respirators for protection against more than 140 hazards to lungs and respiratory systems; and wide variety of safety clothing and equipment. Your nearest AO Branch Office will be glad to send you complete details.

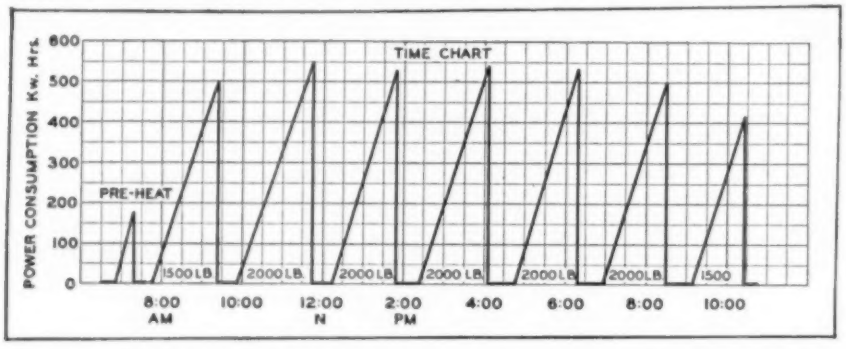
American Optical COMPANY *Safety Division*

SOUTHBRIDGE, MASSACHUSETTS
BRANCHES IN PRINCIPAL CITIES



DAILY PERFORMANCE RECORD ON WHITE IRON PRODUCTION PROVES PRACTICAL ADVANTAGES OF DETROIT ELECTRIC FURNACE

Daily performance record, type AA—400 Kw.—1000 lb. Detroit Electric Furnace. Melting: White iron.



SUMMARY: HOURS OPERATION, 15; NO. HEATS, 7; TAPPING TEMPERATURE, 2900°F. TOTAL METAL MELTED, 13,000 LBS.; TOTAL Kw Hrs. USED, 3735; Kw Hrs. PER TON, 575.

Facts speak for themselves—and here are the facts taken from a daily operating record covering a typical working schedule of a Detroit Electric Furnace. In 15 hours, a 1000 lb. rated capacity Type AA Detroit Electric Furnace melted 7 heats of white iron for a total of 13,000 lbs. Allowing a half hour pre-heat period, as shown in the graph above, that means nearly a half ton of metal was produced every hour. Here is proof that Detroit Electric Furnaces are fast melting and efficient. They produce a superior metal, because their unique construction permits close control over time, temperature, composition, and other vital melting factors. Their closed chamber reduces dirt and fumes to a minimum. They are easy to operate, inexpensive to maintain. Write for further facts on how Detroit Electric Furnaces will speed economical melting of ferrous and non-ferrous metals in your own foundry.

DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN

CHILLED CAR WHEEL IMPROVEMENTS

(*Continued from page* 87)

and annealed correctly.

As manufacturing methods improved, this important test became progressively more severe. It may be noted in Fig. 6 that in early years the thermal band was only 1½-in. thick, and it is said that many wheels failed this test. Gradual increases in the severity of the test are shown and indicate relative improvements in the wheel.

Next to melting and annealing, the perfection of chill control is most important. It is extremely important that the chill be controlled within close limits, and we have found that it is difficult to do this. Since 1940 we have developed methods to improve control. Improvement was made possible through the development of the graphite-tellurium inoculating process. The tread metal has been made harder and the flange and rim metal consists of normal gray iron, assuring higher strength and better impact value. The complete elimination of mottled iron in the flange metal is a must. This method of treating wheels permits an almost positive control of the chill on all wheels. It consists primarily of adding to every ladle of iron poured a very powerful softening agent along with a very powerful hardening agent. This results in a sharper line of demarcation between the soft flange and rim metal and the hard tread metal.

Inoculation Widely Practiced

The inoculating practice is comparable to that adopted in the gray iron industry. Today, practically every progressive manufacturer of gray cast iron has perfected a system of inoculation. Various alloy materials are used, but all are used to a certain degree for the same purpose, namely, for their effect on combined carbon and to produce a dependable uniform material in the finished casting. Tellurium, a discovery of the chilled industry, is 50 times as effective as chromium as a hardening agent.

The reason why we attach so much importance to the perfection of chill control is developed from our service failures. We have found that the best way to improve service records it to prevent the shipment of high chill wheels. Our records show that longest service life is obtained from low shrinkage wheels. For this reason, the AMCCW Specification Committee has gradually adopted closer and more rigid instrumental maximum chill limits. The maximum chill on wheels shipped today is shown in Fig. 10. The impressions shown in the flange are brinell impressions and denote

(*Continued on page* 172)

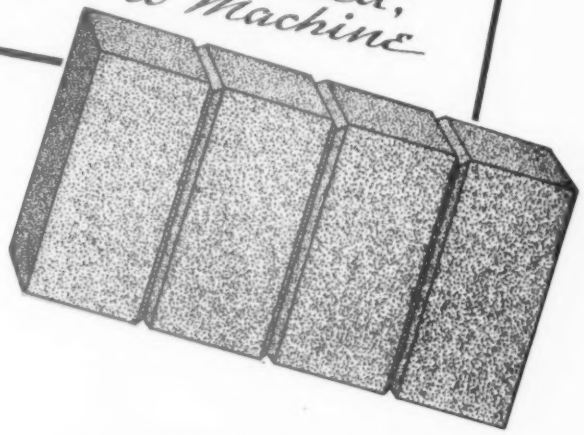
METAL IS CLEANER, *Freer Flowing!*

When you use

Famous CORNELL CUPOLA FLUX

DEFINITE IMPROVEMENT IN CASTINGS!

Tougher, Stronger, Denser Grained, Easier to Machine



Its value and dependability has been proven. Leading foundries have used it regularly for years.

THE COST—but a fraction of a cent per average size casting.

THE RESULT—fewer casting rejects, better satisfied customers, better deliveries, increased prestige.

KEEPS MELTING ZONE CLEAN

FAMOUS CORNELL CUPOLA FLUX forms a glazed or vitrified surface on brick, thereby prolonging its service and insuring a clean drop. Cupola maintenance cost is practically nil.

Write for Bulletin 46-B

ITS SCORED BRICK FORM GREATLY SIMPLIFIES THE USE OF FLUX

You can flux a charge of iron in a few seconds—correctly. Simply toss one brick into cupola for each ton charge of iron or break off a briquette (quarter section) for each 500 pound charge. NO WASTE! Famous Cornell Cupola Flux does not blow out with the blast—it stays in melting zone until entirely consumed.

The* CLEVELAND FLUX *Company

1026-1036 MAIN AVENUE, N. W., CLEVELAND 13, OHIO

Manufacturers of Iron, Brass and Aluminum Fluxes Since 1918

FAMOUS CORNELL FLUXES
Trade Mark Registered

Write for Bulletins

Famous CORNELL ALUMINUM FLUX

Produces clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections are poured. Castings take a higher polish. NO FUMES! Exclusive formula prevents obnoxious gases. Metal does not cling to dross.

Famous CORNELL BRASS FLUX

Makes metal pure and clean, even when dirtiest brass turnings or sweepings are used. Produces castings which withstand high pressure tests and take a beautiful finish. Saves considerable tin and other expensive metals. Crucible and furnace linings are preserved.

Famous CORNELL LADLE FLUX

Place a few ounces in bottom of ladle, then tap cupola. Metal is thoroughly cleansed, foreign impurities are easily skimmed off. Ladles are kept clean, there is less patching and increased ladle life. Metal temperatures are retained during transfer to molds.

LASTS LONGER... WITH LESS AIR

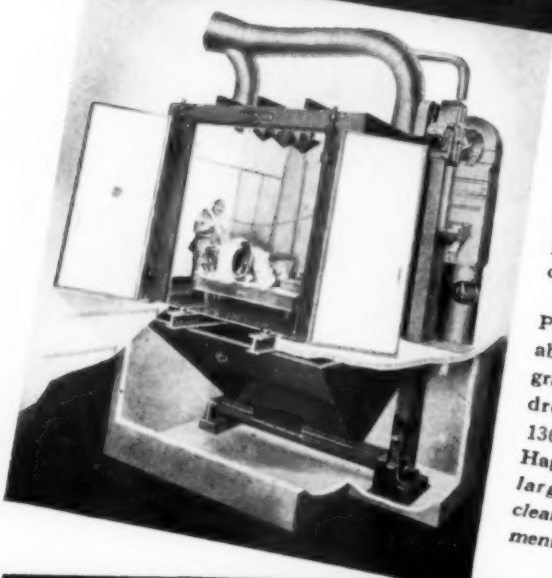
1500 hours is the guaranteed service life of the Pangborn Norbide* Nozzle used with metal abrasive. Such long life is due to a liner that is made of boron carbide — the strongest, hardest, most abrasive-resisting substance ever made for commercial use.

Air consumption is reduced 10 to 20% as compared with iron nozzles and blasting efficiency is improved because stream contour and abrasive velocity are maintained.

No other nozzle will out-perform a Pangborn-Norbide. Pangborn Corporation, 1300 Pangborn Boulevard, Hagerstown, Maryland.

*Trademark of Norton Co. for boron carbide

NOW... MEDIUM AND LARGE METAL PARTS CLEANED AT LOWEST POSSIBLE COST



From a simple enclosure to retain dust and flying abrasive, the blast cleaning room has evolved into Pangborn's mechanical system for high-production, low-cost metal cleaning.

Catalog 400 describes such Pangborn features as mechanical abrasive recovery and pneumatic gravity abrasive separation. Address Pangborn Corporation, 1300 Pangborn Boulevard, Hagerstown, Maryland — *world's largest manufacturer of blast cleaning and dust control equipment.*

Pangborn

PANGBORN CORPORATION, HAGERSTOWN, MARYLAND

(*Continued from page* 170)

the relative flange hardness as well as the depth of chill.

Illustrative of the actual accomplishments toward perfection in chill control are the flange brinell hardness specifications from 1939 to 1946 listed in Fig. 10. Each of these changes indicates a relative degree of progress which can be attributed to our manufacturing methods. It will be noted that the instrumental limits for brinell hardness have decreased from 321 in the flange location to a normal cast iron hardness of 200 brinell. These decreases were accomplished gradually through adjustments in operating practices and operating control.

Show Gradual Progress

Fig. 11 illustrates our present product as compared to that shipped in former years. The photographs might be described as showing the past, present, and future product and do not represent the worst or the best product but are indicative of the average. In 1939 we were not using tellurium and had a brinell specification of 321 in the flange. In 1942 we were using tellurium-graphite and our maximum flange hardness was 265. Although the 1946 photograph is not truly representative of all the wheels being shipped today, we can say that we are gradually perfecting our control and have good reason to believe that we will reach this goal within the next few years. With our present maximum specification of 200 brinell in the flange, the majority of the wheels are in this classification. However, the average will be somewhere between the 1942 and 1946 illustrations.

The macrographs shown indicate the result of the development of our metallurgical knowledge. It is quite generally accepted that high chill wheels are susceptible to seams, and seams are the results of intergranular failure. The higher the chill, the greater the differential stress because of metal shrinkage. In service the constant intermittent heating and cooling, expansion and contraction of the material under heavy loads, causes the development of internal stress and eventually results in fatigue failure. It seems reasonable, therefore, to expect that a material with long coarse grains will be more likely to develop seams than a granular material with a fine grain size.

Differences in these types of materials are shown by these macrographs. Although we have not reached the point where we have positive control of the structural formation of our wheels, we do know what character of metal causes the dendritic material and what type produces the granular material.

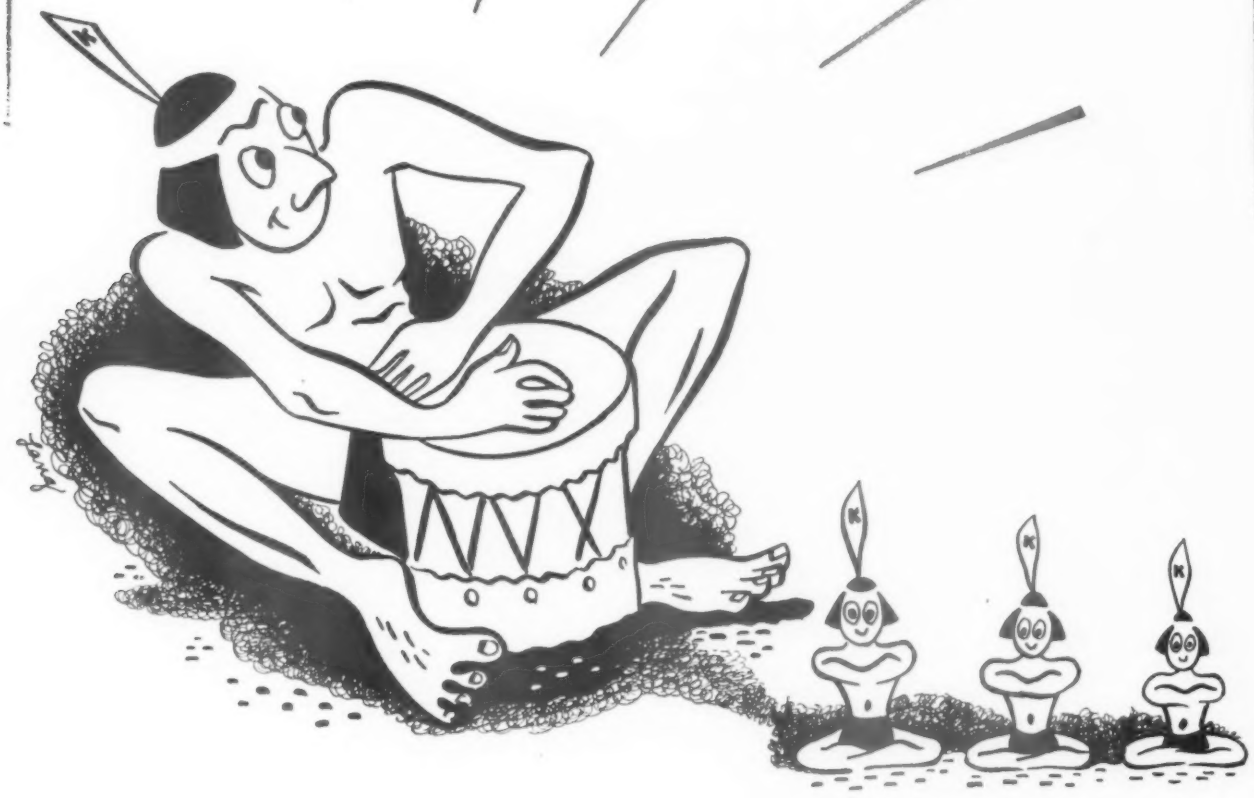
The first structure was produced by methods used at that time, namely high

(*Concluded on page* 175)

"take it" from Chief Keokuk

"LOWEST ULTIMATE COST...

...that's Keokuk Electro-Silvery"



When Chief Keokuk says "lowest ultimate cost," he means just that! And Keokuk Electro-Silvery means highest quality and uniformity. The Chief isn't talking through his feathers... he'll prove every word. Write today for complete information.

60-lb. pigs for blocking the open hearth heat.

30-lb. pigs for charging the cupola.

12½-lb. piglets (for foundries) no weighing — charge by count.

KEOKUK ELECTRO-METALS COMPANY

KEOKUK, IOWA

Sales Agents: MILLER AND COMPANY, 332 S. MICHIGAN AVE., Chicago 4, Illinois
3504 Carew Tower, Cincinnati 2, Ohio — 407 N. Eighth Street, St. Louis 1, Missouri

Reduction in "leaker" losses proves economy of FERROCARBO Briquettes

80% reduction in scrap losses from "leakers" was effected by using FERROCARBO briquettes in a large automotive foundry.

Producing pressure type castings, this manufacturer experienced an abnormally high loss caused by "leakers." Seeking means of correcting this trouble, he turned to FERROCARBO briquettes. Their use, with a properly adjusted charge, provided the solution. Losses dropped 80% immediately.

This exceptional result was made possible by the deoxidizing and inoculating qualities of FERROCARBO briquettes. A well distributed graphite pattern in a matrix of finer pearlite and a small cell size were the important factors. Highly machinable, this microstructure also provided maximum wear resistance.

Showing their effectiveness and economy in such an unusual case, FERROCARBO briquettes offer proportionate advantages in any similar operation. Our metallurgists will be glad to assist you in gaining the benefits resulting from the powerful inoculating and deoxidizing action of FERROCARBO briquettes. Simply write Dept. L-27 for prompt attention. The Carborundum Company, Refractories Division, Perth Amboy, New Jersey.

FERROCARBO Briquettes
BY CARBORUNDUM
TRADE MARK

FERROCARBO Distributors: Ketchner, Marshall & Co., Pittsburgh, Cleveland and Birmingham; Miller and Company, Chicago, St. Louis and Cincinnati

"Carborundum" and "Ferrocarbo" are registered trademarks which indicate manufacture by The Carborundum Company

(*Concluded from page* 172)

metal temperatures both melting and pouring, low silicon or manganese and oxidized metal. The second structure is more representative of our present product. The third is probably the ultimate we would like to attain. It is fundamentally good in that it has a fine grain homogeneous structure which is generally recognized as a desirable quality in any material. During the past two years the greatest portion of our product has been made under conditions that are favorable to this type of material. The trend has been towards the practice of melting the metal softer with a higher silicon content, pouring at accurately controlled metal temperatures.

Improve Rim Strength

Various steps taken to increase rim thickness and improve rim strength are indicated by the composite drawing in Fig. 7. Numerals at the right show the increases in inches and the dates they were made. At the bottom, corresponding impact strength is given for the changes from the 1⅞-in. rim thickness to the 2⅛-in. thickness. Note the increase in rim strength from six to ten blows on 700-lb wheels and from 4.8 to 16.5 blows on 750-lb wheels. The 2⅛-in. rim has been adopted as standard on 750-lb wheels and is being considered for the 700-lb wheels.

With our recent improvements in operating and control methods, wheel flange strength has increased from 66,000 to 88,000 lb, or about 33 per cent.

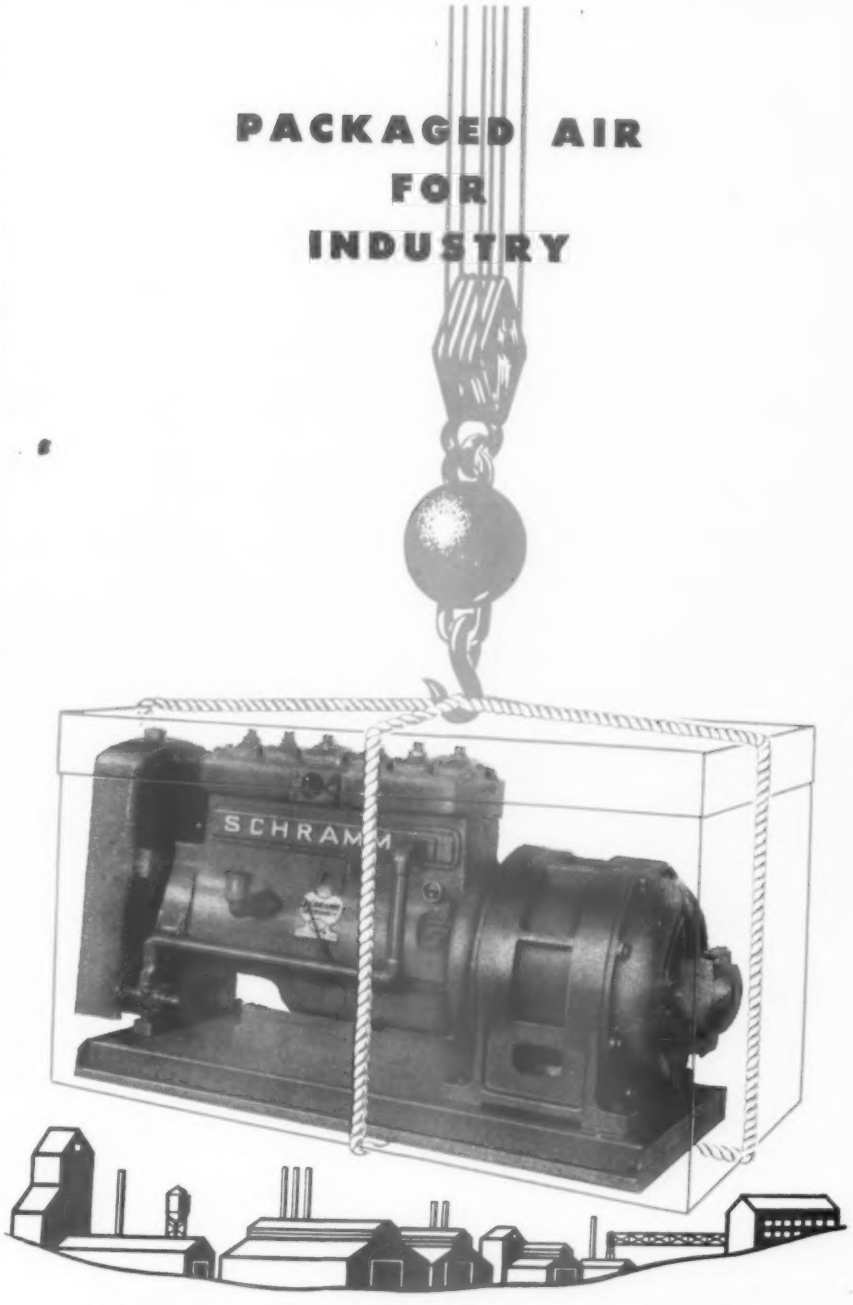
In conclusion, and as a summary, the progressive steps that have been taken to improve our practices and uniformity are listed below:

1. Adoption of scientific methods of cupola and melting control. 2. Development of the tellurium-graphite inoculating practice. 3. Chill control. 4. Metal temperature control. 5. Perfection of annealing practice for the elimination of internal stress. 6. Improvement in metallurgical and structural control. 7. Improved design for stronger rims and flanges. 8. Adoption of a rigid instrumental chill specification to assure elimination of high chill wheels through rigid inspection.

WAA Offers Booklet

Cleveland regional office, War Assets Administration, has published an informational guide, "The Present Disposal Program of Surplus War Property." It outlines the most expeditious methods of buying, lists current sales, their location and the commodities available. Copies are available on request at Chambers of Commerce, and at WAA offices in Cleveland and Toledo, O. and at Pittsburgh.

PACKAGED AIR FOR INDUSTRY



Packaged air . . . when and where you need it . . . is always there when you have a stationary or portable Schramm Compressor. Designed for rugged, reliable duty, Schramm Compressors give a continuous flow of air with a minimum of maintenance. Of special advantage to the Industrial Engineer are these Schramm Compressor features:

1. **Completely watercooled to provide ideal performance in winter as well as summer.**
2. **Main bearings for every cylinder.**
3. **Mechanical Intake Valve.**
4. **More cylinders and lighter parts.**
5. **Forced feed lubrication.**

Make your compressed air problems easier by using Schramm Air Compressors. Write today for construction details on these rugged, reliable units.

SCHRAMM INC.

THE COMPRESSOR PEOPLE
WEST CHESTER
PENNSYLVANIA

CORE ROOM SPEEDMULLOR AND 2 SANDSLINGERS

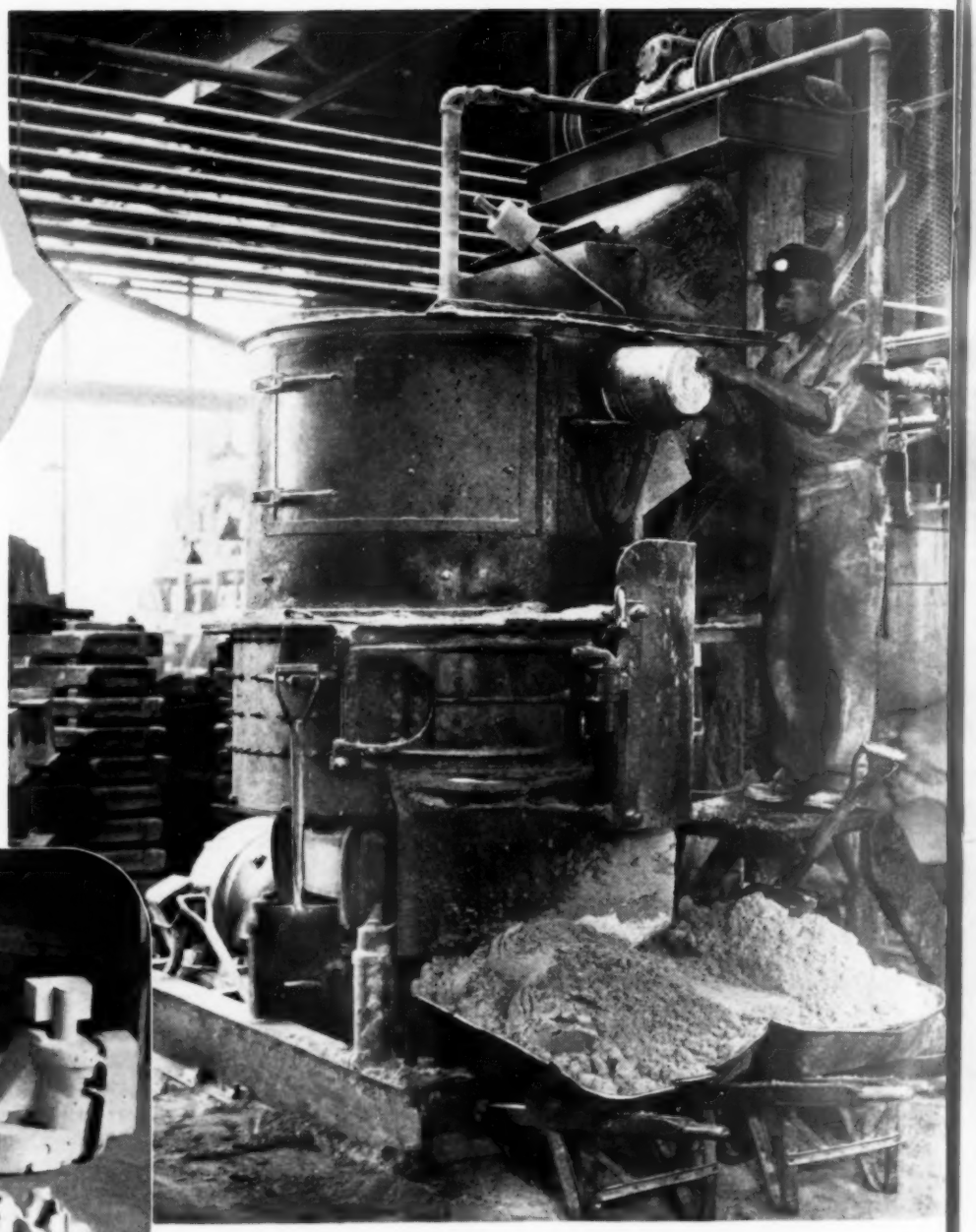
assure peak production for Standard

An Interesting Report of Foundry Operations at

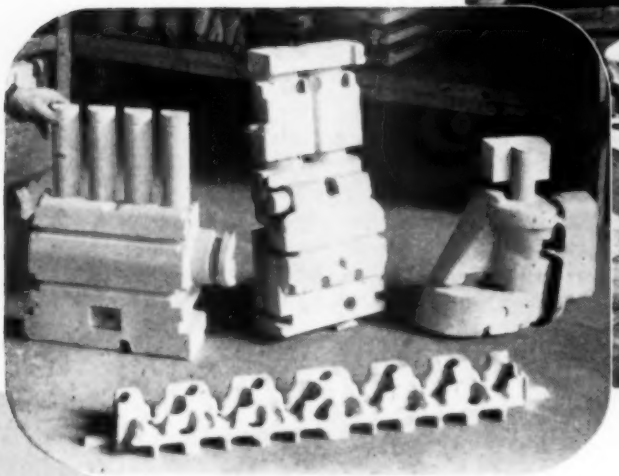
STANDARD FOUNDRY CO.

Racine, Wis.

A Condensation of an article from The Beardsley & Piper Co's "Better Methods"



Standard's No. 50 Core Room Speedmullor. Mulling time per batch: approximately 1½ minutes (variable)



Group of typical cores produced at Standard Foundry Co. All the core sand is mulled quickly and uniformly in the Speedmullor. Foundries everywhere report large savings in core oil because the Speedmullor's uniform mulling develops the greatest plastic strength and workability from the least amount of binder.

AT Standard Foundry Co., a No. 50 Speedmullor (with skip hoist for loading) mulls all of their core sand. Standard uses cores in large numbers and often produces them during both the day and night shifts. When the demand for core sand is at a peak, the Speedmullor easily mulls from 40 to 50 tons during these two shifts. Many types of mixers have mulling cycles for core sand that is

(*Continued on next page*)

CORE ROOM SPEEDMULLOR . . .
(Continued from previous page)

anywhere from 5 to 10 minutes per batch—the Speedmullor at Standard does a complete job in 1½ minutes per batch!

● *One of Standard's two Stationary Sandslingers which ram a large variety of molds.*

The Speedmullor's positive mulling action kneads, squeezes and aerates the sand to exact specifications*. Standard's No. 50 Speedmullor has a batch capacity of 7½ cubic feet. It incorporates all of the essential requirements for uniform mulling: (1) Pressure—continuous squeezing without damaging sand structure, (2) Rapid agitation—entire batch receives thorough mulling, (3) Blending—uniform distribution of bonding elements, (4) Thorough aeration.

The two Stationary Sandslingers at Standard have been in operation for over 18 years. They reduced

● *Cylinder and cylinder head casting—core sand for these cores was mulled in the Speedmullor—molds rammed by Sandslingers.*

ramming costs from 40% to 50% over the previous molding method. Scrap was reduced to a minimum and castings are truer to pattern.

The Beardsley & Piper Company, 2424 N. Cicero Ave., Chicago 39, Illinois.

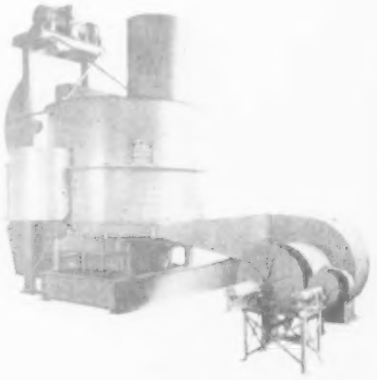
**All Speedmullors can be easily equipped, if so desired, with air cooling. With this feature, hot shake-out sand is cooled to within 5 or 10 degrees of room temperature during the Speedmullor's mulling cycle. Actually cooling the sand while it is being mulled is extremely important to foundries where sand is rapidly reused.*

HOT **SAND** COOLED **AS IT IS MULLED**

Speedmullors for all foundries large & small!

Model 30 Speedmullor with skip hoist for loading. Popular with small and medium sized foundries. Batch size 3 cubic feet.

Model 80 Speedmullor. Handles big mulling jobs with ease! Batch size 20 cubic feet.



Model 80 Speedmullor with air cooling. Batch size 20 cubic ft. All Speedmullors are available with air cooling.

SPEEDMULLOR!

- *4½ times faster than any other mulling equipment*
- *Aerates as it mulls*
- *Cools as it mulls*

Small, medium or large foundry—you'll have more thoroughly mulled sand, faster with a Speedmullor. Furnished in a variety of sizes with or without skip hoist; air cooling; fines removal. Also available for completely automatic operation; batch weighing, loading, mulling, cooling and discharging.

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THE BEARDSLEY & PIPER COMPANY

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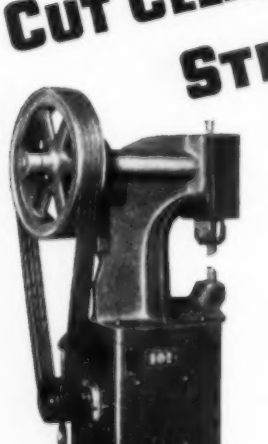
CUT CLEANING-ROOM COSTS!
STEP-UP PRODUCTION!
with the Milwaukee-
Tessmer Sprue Cutter . . .



MODEL H — with Built-in Motor Drive and Speed Reducer.

Cutting sprues and gates on non-ferrous castings becomes a one-man operation with this machine. What's more, a skilled operator isn't needed. Any workman can learn to run the Milwaukee at top capacity in a short time.

It results in a fast, steady flow of work through the cleaning department; accumulations of unfinished work are eliminated, less storage space is required because castings are trimmed and cleaned as they come from the foundry.

With the Milwaukee, ONE SWIFT, SURE STROKE clips gates or sprues in a matter of seconds; slow, tedious hand labor is eliminated, manpower released for more important work. Latest models of the Milwaukee-Tessmer Sprue Cutter are described and illustrated in a New Bulletin — just off the press. Write for your copy.

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A 5131-2½

PRICING CASTINGS FOR PROFIT

(*Continued from page* 73)

A further development of this system is a price per pound above the price of "lake copper" or "85-5-5-'s" or some other "quoted" price for metal. The variations are almost unlimited, but they all consist of what is essentially a very simple guess or, at best, a long experience of averaging the good and the bad, mostly the bad.

These systems all have one thing in common in that no segregation of costs worthy of the name is identifiable, and it survives solely because it is competitive. Its devotees are still too large for a happy or healthy industry.

The "Target" System—The second system in the ascending scale is a very prevalent one despite all the vicissitudes of business. It consists of a segregation of costs into metal cost and an estimate of labor time. The metal cost is usually the price of the metal only, but particularly in gray iron it is a combined figure equivalent to the cost of "metal at the spout" or "metal ready to pour." Some figure such as 2, 2¼ or 2½c is most frequently used. All other costs are lumped on the molder. A charge of $4.50 per hour, $35 per day or some such figure is borrowed from a former boss, picked up at a convention talk on costs, or more rarely calculated from some record of the seller's past costs. An estimate of molding time is made and from this a cost in cents per pound or dollars per ton is arrived at. To this is added the foregoing cost of metal to arrive at what, for want of a better term, I have called the "The Target Price." Generally the seller would be happy to get this price since he usually estimates liberally enough on the average job. Unfortunately, he is high on the simple ones and low on the more complex ones. Negotiation then starts with the buyer if the piece is simple. If the piece is difficult he may receive a "whale" of an order without too much sparring.

This system is probably somewhat better than the first since, at least, the seller makes an effort to evaluate at least one item of cost on an individual casting basis. Its shortcomings are obvious and bad.

Early in the war roughly one-fifth of the foundries' pricing methods had to be included in the first two classes. It is true, they do not represent more than about 5 to 10 per cent of the total sales, but they pull at the fringe of the buyers' coat and during more competitive times get more than the "crumbs which fall from the table for the dogs," as it is so aptly stated in the Bible. The principal characteristic of these two sys-

tems is that there is no conscious segregation of costs and profit. Profit apparently is supposed to be an inevitable by-product of processing material through the use of labor. Unfortunately, this system usually has to wait until the year-end to find out whether or not there is a profit, and by that time frequently the knowledge is too late to do much good.

The "Primary" Estimating System—This system is an improvement over the two previous ones in that it segregates one more factor in costs. This group estimates a price by making a separate charge for metal or metal cost (usually a fixed amount for all castings), a variable direct labor charge based on an estimate of time required to produce the casting (usually limited to molding and coremaking), and a third factor called profit or overhead. This latter item invariably includes many items of cost and is far in excess of any anticipated profit. It usually runs from 20 to 50 per cent of the sum of the two other items. A particular foundry, for example, had 40 per cent markup in 1941 but realized only 3½ per cent profit. These various factors are only crudely related to cost records and invariably cannot be verified by an accounting study. The number in this group is fairly substantial.

These first three groups cover roughly one-third of the foundries but are limited almost exclusively to gray iron and brass and bronze foundries. The following is an example of this method:

"PRIMARY" METHOD

1. **Metal and Conversion Cost.** (Finished weight) . . . . . 2¼c per lb
2. **Molding Cost.** Rate per hour $3.50. Estimate the number of pounds of good castings that will be produced by the molder in one hour. Divide this weight into the above rate per hour to obtain cost in cents per pounds for molding . . 3
3. **Coremaking Cost.** Rate per hour $2.50. Estimate the number of good cores (or sets of cores) which can be produced by the coremaker in one hour. Divide the estimated number of cores into the above rate per hour to determine the cost per core or sets of cores. Divide the cost per core or per sets of cores by the weight of one casting to determine the cost of the core per pound of castings. . 2
4. **SELLING PRICE** (Sums of Items 1 to 3) . . . . . 7¼c per lb

Pricing Methods Tied to Costs—This and the following methods are the first ones which are tied definitely to some cost data. They differ primarily in the degree of segregation of cost, accuracy of accounting data and refinements.

Type A. To the primary factors of metal and direct labor, there is a direct breakdown between what is considered burden and profit. In other words, there is a conscious effort made to include as costs in the estimate both direct and indirect labor and metal, allocating indirect labor as a percentage of direct labor and allocating other overhead as a percentage of the sum of direct and indirect labor and metal, and then ap-

Low Cost Mulling!

the MULBARO

IT'S REALLY PORTABLE

• Here's the *only* portable mullor—the *only* versatile mullor! Ideal for regular or special batches in a small or large foundry. Low initial cost—economical in operation!

Available in two sizes—3½ cu. ft. and 7 cu. ft. batch capacity.

Synthetic sand or natural molding sand (facings) mulled with efficiency and thoroughness.

Core sand uniformly mixed with oils—then wheeled direct to benches

JUST fill the Mulbaro's barrow with sand and lower the mulling mechanism—the rubber-covered mullor wheels and steel plow assembly have proven to provide the ultimate in distribution of additions and mulling results. A real mulling job done fast, at lowest cost. When mulled, the sand is in its container, ready for delivery. Write for catalog.

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plying a profit factor (usually fixed) as a percentage of all prior costs.

The direct labor calculation usually is limited to molding and coremaking. Frequently a separate charge is made for cleaning but usually at a fixed cents per pound or as some percentage of molding and coremaking cost.

Type B. Another variant includes all of the foregoing factors plus a separate charge for melting. This melting charge usually is reduced to a cents-per-pound charge of finished weight and makes no provision for variations in yield. The following example is an illustration of this type.

EXAMPLE "B"—"SIMPLE" METHOD TIED TO COSTS

1. **Molding Cost.** Rate per hour $1.25. Estimate the number of pounds of castings (good and bad) that will be produced by the molder in one hour. Divide this weight into the above rate per hour to obtain cost in cents per pound for molding		2c per lb
2. **Coremaking Cost.** Rate per hour $1.25. Estimate the number of good cores (or sets of cores) which can be produced by the coremaker in one hour. Divide the estimated number of cores into the above rate per hour to determine the cost per core or sets of cores. Divide the cost per core or per sets of cores by the weight of one casting to determine the cost of the core per pound of casting	1	
3. **Cleaning Cost.**	1	
4. **Total Direct Labor** (Items 1, 2 & 3)		4
5. **Factory Burden** (100% of Item 4)		4
6. **Metal and Conversion Cost**		
(a) Metal (at delivered price)	14	
(b) Melting Cost	2	
7. **Total** (Items 4, 5 & 6)		24
8. **Profit** (25% of Item 7)		6
9. **SELLING PRICE** (Items 7 and 8)		30c

Type C. The next system adds the following requirements: Direct molding, coremaking and cleaning labor as separate items. Separate departmental burden rates are determined by making a real attempt to allocate costs directly to the departments and rates tying in reasonably well with the records. Metal and melting are figured separately, but melting is an average charge per pound of finished castings. Occasionally metal loss is segregated from conversion cost and applied either as a fixed percentage of metal price or at varying percentages depending on the alloy. Rejects and defectives are estimated. General, selling and administrative expense is applied as a per cent of total manufacturing cost, but frequently it is a fixed charge per pound. Profit is usually a fixed percentage of total cost. The following example is a good illustration of this type of formula.

EXAMPLE "C"—REASONABLE DEPARTMENTALIZATION AND ACCOUNTING TIE-IN

1. (a) **Molding Cost.** Rate per hour $1.20. Estimate the number of pounds of castings (good and bad) that will be produced by the molder in one hour. Divide this weight into the above rate per hour to obtain cost in cents per pound for molding		1c per lb
(b) **Molding Burden** (100% of Item 1(a))	1	
2. (a) **Coremaking Cost.** Rate per hour $1. Estimate the number of good cores (or sets of cores) which can be produced by the coremaker in one hour. Divide the estimated number of cores into the above rate per hour to determine the cost per core or sets of cores. Divide the cost per core or per sets of cores by weight of one casting to determine the cost of the core per pound of castings	½	
(b) **Coremaking Burden** (200% of Item 2(a))	1	
3. (a) **Cleaning Cost.** Rate per hour $0.80. Estimate the number of castings that can be cleaned per hour and multiply by the weight of the casting. Divide this weight into the above rate per hour to determine the cleaning cost.	1	
(b) **Cleaning Burden** (150% of Item 3(a))	1½	
4. **Total Direct Labor and Burden** (Sum of Items 1, 2 & 3)		6
5. **Metal and Conversion Cost**		
(a) Metal (at delivered price)	15½	
(b) Metal loss (Not to exceed 10% of 5(a))	1½	
(c) Melting Cost (Not to exceed 2c/lb of cstg.)	2	
6. Total of Metal and Conversion Cost		19
7. **Total Manufacturing Cost** (Items 4 & 6)		25
8. **General Administrative and Selling** (10% of Item 7)		2½
9. Total Cost (Items 7 and 8)		27½
10. **Defectives and Returns** (7% of Item 9 minus Item 5(a))		1
11. **Total** (Items 9 and 10)		28½
12. **Profit** (10% of Item 11)		2¾
13. **SELLING PRICE, Cents per lb** (Items 11 and 12)		31¼

Type D. This last category, illustrated by the following example, embraces all other methods. It is more comprehensive than any of the foregoing and, with the exception of certain factors, can usually be tied accurately to the records.

Yield. The most common addition to the other types of formulas is the use of a yield factor. This cost is usually applied in the form of a yield table, but frequently the yield cost is computed individually for each casting. This factor is of particular significance where metal cost is high, such as copper and aluminum base alloys. It is of vital significance in magnesium and in alloys like manganese bronze, aluminum bronze, or certain steels, which require substantial amounts of metal in the sprues, gates and risers. Ignorance of this factor or failure to use it can well mean the difference between a profit and a loss in pricing low yield castings. During the war a fair average cost of metal in the finished magnesium casting was 45c per lb. This, of course, included conversion, metal loss, melting cost, etc. In certain castings of a simple design this might run as low as 30c per pound. In other extremely difficult castings with yields of 10 or 15 per cent, it would run as high as 90c. It is obvious that a sale of a casting which was priced on an average metal conversion cost basis might be as much as 15c too high or as much as 45c too low. This is an amount frequently as great as the sum of all the direct labor items combined.

Reject or Defective Factor. Formulas in this class usually carry a reject factor. Generally this factor is calculated on manufacturing cost, sometimes on total cost, and less frequently on direct labor only. Often the formula carries a reject factor for each direct labor operation plus a general customer reject factor.

Greater Departmentalization. More departmentalization also is present. For example, cleaning is divided into grinding, chipping, sand blast, inspection and shipping. Service departments are treated separately as pattern shop, engineering, etc. Further refinements include charges for special equipment such as flasks, inserts, patterns, chills and the like. Coremaking is broken down into estimates on direct labor and core sand used. Molding may be subdivided into floor, bench squeezer, roll-over, sandslinger, etc., each carrying different wage rates and different burdens.

Metal. A relatively few companies take the delivered price of metal and to it add only a profit or handling charge. All other expenses are carried by allocation to direct labor.

The variations in detail are almost unlimited. In many cases refinements are completely at variance with good judgment. For example, a particular company computes its burden at 162.93 per cent of direct labor for molding. Molding direct labor is itself an estimate hardly accurate to 5 per cent, but after calculating all these costs to micrometer precision, the company ends up with an adjustment factor called profit running from 10 to 100 per cent of all foregoing costs. This seems utterly ridiculous. Subsequent checks on burden rates after three to six months of operation have seldom been within 5 per cent of any prior period and frequently vary much more. The following is an example of a detailed pricing method:

EXAMPLE "D"—DETAILED PRICING METHOD

1. **Metal and Conversion Cost.** Based on a yield of 20 lb of good castings. Initial cost of total metal melted to produce 20 lb of good castings—100 lbs @ 15c (delivered price)			$15.00
(a) Recovered rejects (Foundry and customer—15 lb @ 12c	$1.80		
(b) Recovered gates, pigs and risers — 50 lb @ 12c	6.00		
(c) Skim, spill, etc.—5 lb @ 4c	.20		
(d) Uncovered loss — 10 lb @ 0c	.00		
Total recovered			8.0(
Cost of Metal in Casting			7.00
Cost per pound $\frac{7.00}{20}$		$0.35	
Total Metal and Conversion Cost per lb of casting		35c	
2. (a) Molding Direct Labor @ $1.20 per hour[1]		4	
(b) Molding Burden — 200% of 2(a)		8	
3. (a) Coremaking Direct Labor @ $1.20 per hour[2]		2	
(b) Coremaking Burden — 100% of 3(a)		2	
(c) Core Sand Cost @ 50c/100 lbs—2 lbs/lb of cstg.		1	
4. (a) Grinding Direct Labor @ $1 per hour[3]		2	
(b) Grinding Burden — 200% of 4(a)		4	
5. (a) Sandblasting Direct Labor @ $0.80 per hour[4]		1	
(b) Sandblasting Burden — 400% of 5(a)		4	
6. Subtotal (Sum of Items 1 to 5 inclusive)			63c

(*Concluded on page* 182)

50% less baking time

WITH SWAN-FINCH CORE BINDER

Circumstances vary from plant to plant—yet one pattern follows consistently through hundreds of case histories in our files: a pattern of savings, better castings, when Swan-Finch core binders replace others that seemed to be "good enough."

Individually recommended for specific uses in specific plants, S-F core binders repeatedly outperform binders bought "cold"—without the thorough investigation a Swan-Finch man makes. Chances overwhelmingly favor that *they will for you, too!*

Behind the Swan-Finch man is 90 years of Swan-Finch experience, long familiarity with foundry practice. Call him in. Let him spend a short while in *your* plant. He'll recommend the *best* binder for *you*. No cost for his call, no obligation—*no interruption of production*. Coupon below brings him.

SWAN-FINCH CASE HISTORY No. 1231

Product being made:	Aluminum and bronze castings
Originally used:	Oil-sand mix
Switched to:	Swan-Finch Core Binder RB 42
BAKING TEMPERATURE (with S-F Binder):	Reduced to 350° F.
BAKING TIME (with S-F Binder):	Reduced 50%
SHAKE-OUT TIME (with S-F Binder):	Reduced 83.3%
EXTRA Benefit:	Improved finish of castings reduced machining considerably

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Perhaps we can show improvement with "RB 42" Core Binder. Send a Swan-Finch engineer to our plant and let's see.

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VIBROLATOR

ALL DIRECTIONAL
QUIET • POWERFUL
LONG LIFE . . . .

The VIBROLATOR embodies an entirely new trend in mechanical vibration, incorporating a principle so simple and practical that long satisfaction and service life are assured.

VIBROLATORS are small compact units, ruggedly constructed to produce quiet, noiseless, and ALL-DIRECTIONAL vibration. There are five sizes of VIBROLATORS from which correct selection is assured.

Ask your supply house for a demonstration, they will be glad to cooperate.

HOW IT WORKS

1. Compressed air line is attached at this point.
2. Velocity of air is increased as it passes through this venturi.
3. Accelerated air passes through race creating a turbine action within the unit.
4. The steel ball is driven at great speed around the hardened steel race producing a powerful all-directional vibration.
5. Spent air passes outward around the bolt and exhausts through sand excluding exhaust ports under the name plate.

MARTIN ENGINEERING CO.

KEWANEE, ILLINOIS

(*Concluded from page* 180)

7. General Manufacturing Overhead —20% of Item 6	12.6
8. **Manufacturing Cost** (Sum of Items 6 and 7)	75.6
9. Selling and Administrative Expense—8% of Item 8	6
10. Subtotal (Sum of Items 8 and 9)	81.6
11. Customers' Returns and Credits—2% of Item 10	1.6
12. **Total Cost**	83.2
13. Amortization of patterns (first order)	2.8
14. Subtotal (Sum of Items 12 and 13)	86.0
15. Profit—20% of Item 14	17.2
16. **SELLING PRICE**, Cents per lb	103.2

1. Estimate the number of pounds of castings (good and bad) that will be produced by the molder in one hour. Divide this weight into the molding rate per hour to obtain cost in cents per pound for molding.

2. Estimate the number of good cores (or sets of cores) which can be produced by the coremaker in one hour. Divide the estimated number of cores into the coremaking rate per hour to determine the cost per core or per sets of cores. Divide the cost per core or per sets of cores by the weight of one casting to determine the cost of the core per pound of casting.

3. Estimate the number of castings that can be cleaned per hour and multiply by the weight of the casting. Divide this weight into the cleaning rate per hour to determine the cleaning cost.

4. Determine the costs for all other direct labor factors in the same manner as outlined in [1], [2] and [3].

ENGINEER LOOKS AT SAND PROBLEMS

(*Continued from page* 67)

The montmorillonite clays give the highest bonding ratio for any of the widely used sand bonding materials. They roughly give from 1½ to 2 lb green compression strength for each per cent of clay substance. With this somewhat broad comparison in mind for these three general types of sand binders, it can be pointed out why, in the different sand practices, clay content of molding sand can be a major problem.

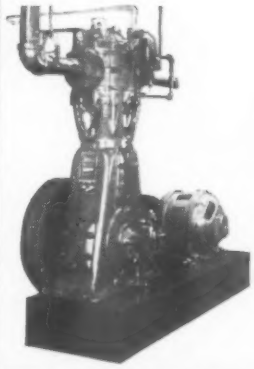
In the foundries employing natural molding sand, which includes iron, both heavy and light, malleable and nonferrous foundries, the accepted green bond strength of molding sand is between 5 and 7.5 psi green compression strength. This represents a clay of 10 to 15 per cent by analysis. By mulling this sand, the green strength goes up considerably but after use will drop back unless continued mulling of the sand is put into effect or one of the stronger clays is employed to bolster the bond strength.

Under these conditions and clay contents, these sands seem to perform rather successfully, the control of them being mostly limited to the selection of the best grade for the finish desired and reasonable moisture additions. Should the clay content drop much below 12 per cent, sand problems will develop causing considerable loss in production due to dirt and rat tails. Clay content in these sands greater than 15 per cent

(*Continued on page* 184)

NIGHT AND DAY
SULLIVAN
SERIES 100 - HEAVY DUTY
AIR COMPRESSORS
STAY ON THE JOB!

Trouble-free, 24-hour a day service is typical of powerful, compact Sullivan compressors. Model WN-114 shown here available in four sizes—has four cylinders, 175 to 300 H. P.



WG-9 AIR COMPRESSOR

Saves space and money

Single stage, double acting, water-cooled, vertical compressor that needs only a simple block foundation. Size with sheave only 3' x 2' 10" x 5' 10" high. Cylinder liners replaceable on job.

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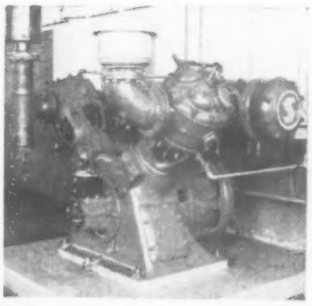

WN-112 COMPRESSOR

Two cylinder, V-vertical type. Double acting, water-cooled "Dual-Cushion" valves, full force feed lubrication, removable cylinders and crosshead guides. Six sizes—60 to 150 H. P.

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SULLIVAN DIVISION

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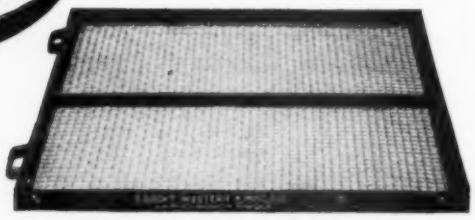
GENERAL OFFICES: HENRY W. OLIVER BLDG., PITTSBURGH, PA.

Consult a Joy Engineer

HOW ARE YOU FIXED FOR EXTRA SCREENS?

Combs sieve bottoms are made of very heavy galvanized wire in numerous gauges and mesh. Quantity discounts apply . . . it pays in many ways to order extra screens for your Combs units. Ask your foundry supply house or write us direct for complete price and specification pages on the Combs line.

Steel Rim and Bottom
For Your Combs
Riddle Types V and V-5.



For Your Combs
Type CS Riddle→

Order This Style
For Your Combs
CR Units.

SIEVE BOTTOMS

W & M GAUGE MESH	WIRE	LIST PRICES V	CR	CS	V-5	W & M GAUGE MESH	WIRE	LIST PRICES V	CR	CS	V-5
2	14	$1.30	$1.80	$2.25	$4.20	5	20	$1.30	$1.80	$2.25	$4.20
3	16	1.30	1.80	2.25	4.20	6	20	1.30	1.80	2.25	4.20
3-1/2	18	1.30	1.80	2.25	4.20	8	20	1.30	1.80	2.25	5.00
4	18	1.30	1.80	2.25	4.20						

Discounts 1 to 5—Net
6 to 23—5%
24 or more—10%
Can be mixed meshes but for same type machine.

Steel Rims
Type V $3.60 set
Types CR-CS 5.10 set
Type V-5 14.50 set

COMBS FOUNDRY RIDDLES AND SCREENS DISTRIBUTED BY ALL LEADING FOUNDRY SUPPLY HOUSES

Great Western Manufacturing Company
LEAVENWORTH, KANSAS

(*Continued from page* 182)

usually present a troublesome sand problem in the form of clay balls.

Much of the early rebonding of molding sand by the use of fat clay was dependent upon the earthy clays and fine clays. These were added to the sand either in the dry pulverized form or by the wet slurry form. This latter method is a very economical practice, for it allows the use of local clay which need not be either dried or ground before using and it assures a rather complete distribution of the clay throughout the sand pile.

Clay Content Varies

These earthy clays and fine clays must not be considered as one material for actually even the purest of them are only in the range of 50 per cent clay and the less pure grades will contain down to as low as 20 per cent clay substance. The remainder is either sand or silt. This, in many cases, means that while we are adding some fat clay to the sand there is being added at the same time a quantity of fines which may develop into a sand problem resulting from the accumulation. Foundries using these types of clays are, for the most part, making iron and malleable castings where it has been found that the green bond strength of the sands are maintained between 7 and 10 psi green compression strength, this representing a clay content between 9 and 13 per cent by analysis or an amount of clay substance which is considered to be in fair ratio to the sand. In addition, this gives a sufficient broad workable moisture range which requires only a moderate amount of daily control.

The accepted practice is to use seacoal in both iron and malleable molding sand. This material is beneficial in reducing sand burn-on, scabs and buckles. The items to conrtol in this sand practice then are moisture content, clay content or green bond strength, fines and seacoal content. A laxity of controlling any one of these results in many production losses due to sand.

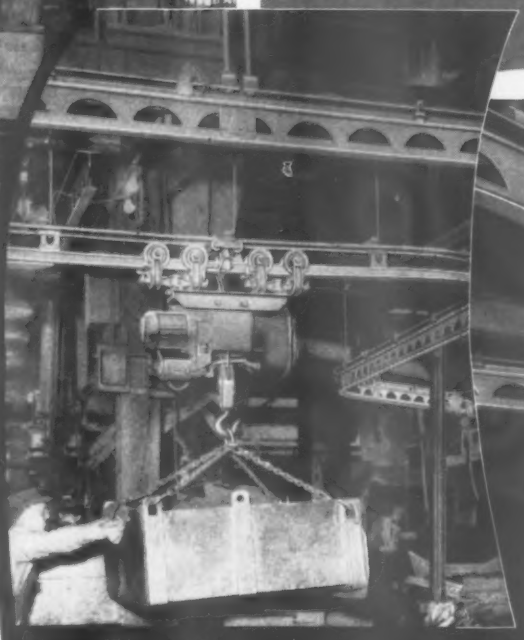
The third class of clays employed widely for use in bonding of molding sand and core sand are the montmorillonite or bentonite clays. They are most always used in the dry pulverized form and, due to their high aluminum content and absence of any large amounts of silt, require only small percentages in any sand mixture to give a suitable green working strength. While these concentrated clay forms are considered by many foundrymen to be the answer to their bonding requirements, the use of them usually requires a closer type of control.

The bentonite clays offer a means whereby sand may be bonded well with

(*Continued on page* 186)

3 TIME-SAVING STEPS IN HANDLING MOLDS TO SHAKEOUT

Dumping molds into shakeout box at pouring floor in a steel foundry.



Heavy loads are easily pushed on smooth overhead rails.

Molds are quickly emptied into shakeout by tipping box with air (or electric) hoist.

The handling of molds to shakeout is one of the many jobs simplified and speeded by overhead Cleveland Tramrail equipment.

Ten or more molds, depending on size are quickly dumped into a shakeout box at pouring floor. The box is conveyed to the shakeout on smooth overhead Cleveland Tramrail cranes and trackage by an easy rolling carrier that may be either of the hand-propelled or motor-driven type. When over the shakeout, it is quickly tipped and emptied by an air or electric hoist.

The same Cleveland Tramrail equipment also cuts costs in delivering molds to pouring floor and speeding pouring operations.

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(*Continued from page* 184)

a minimum amount of clay binder and, at the same time, be high in toughness and tensile strength, enabling the minimum of mold breakage. Bentonite when mulled into sand disperses rapidly due to its colloidal nature. This presents the first problem in the use of bentonite clays. With such a small quantity of binder, the mulling must be thorough to assure uniform distribution.

Assuming for the sake of explanation that this clay was mulled uniformly throughout a sand mixture, the maximum amount of material that a sand will carry is around 8 per cent without developing unduly high green bond strengths, the layer of clay will then be thin upon the surface of each grain of sand. This low quantity of clay substance makes for very narrow workable moisture limits and may lead to free water in the sand which is a potential source of rapid forming steam. The solutions to this condition are those given earlier as the use of a second material which will hold the free water in the absorbed state thus tending to slow up the generation of the steam during pouring of the mold.

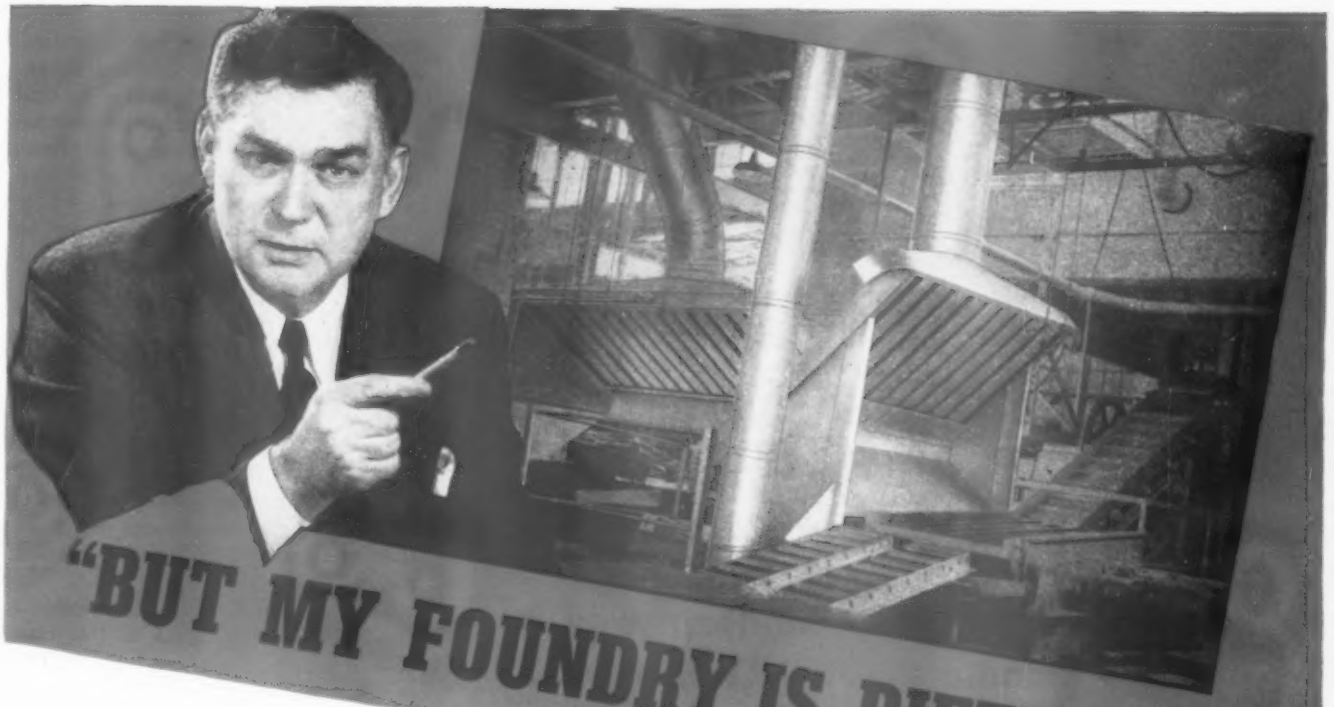
Study Thermal Expansion

Much has been done in recent years in the study of sand's thermal expansion. Among the many conclusions reached, one is that the silica (SiO_2) is responsible for the sand's growth during heating. After expansion and with continued heating of the sand, a shrinkage in volume takes place. This is concluded to be a result of both shrinking of the clay substance, as a result of loss of its chemical moisture, and a melting of the sand grains as they are attacked by heat and chemical fluxes.

From this general explanation, the question arises as to which point the expansion of silica is arrested by shrinkage of the clay in a bonded sand mixture. It is the author's opinion that this occurs somewhere in the range of 88 per cent silica and 12 per cent clay substance. This has been termed "the best sand-clay ratio." Using this theoretical point and knowing if the clay and fluxes are high in a sand, it will be expected under heat to have a high volume shrinkage, or if the silica is higher than the "best sand-clay ratio," a sand under heat is apt to have an excessive thermal expansion.

The sand problems in either case will then be allied with the condition of high sand shrinkage or high sand expansion depending in which direction the clay is from the theoretical 12 per cent. The correction of these problems then becomes one of either reducing the clay and fluxes by adding more

(*Continued on page* 188)



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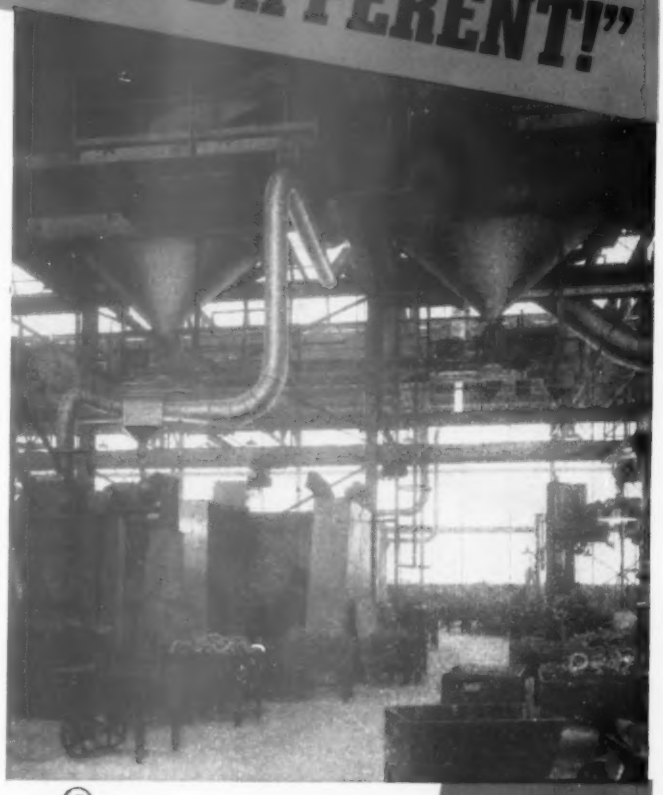

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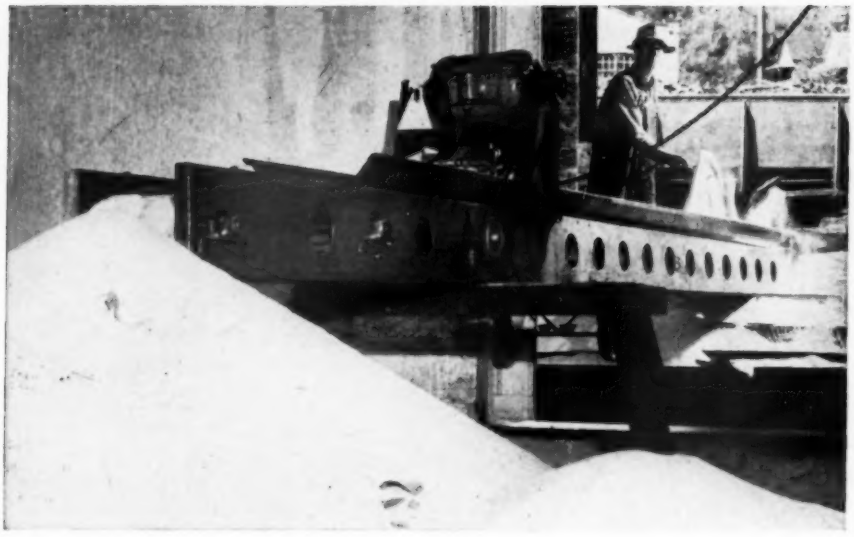

Tote-All the light conveyor that can take it!

Here's the modern way to handle FOUNDRY SAND . . .

Shown above is a Tote-All Portable Conveyor being used to unload foundry sand from a box car into a covered shed. Keeps two men busy shoveling sand into conveyor—steps up their efficiency by making the work easier for them. *(Actual tests show that a Tote-All Conveyor cut 14 hours time from hand-shoveling method during the unloading of a 75-ton car of core sand).*

Tote-All Conveyors are built for the toughest kind of usage, but are lightweight and easy to handle. Power unit, either gasoline or electric, is mounted on top of conveyor—easily accessible and out of the way of dust, dirt and spillage. Available in 14 ft. and 20 ft. lengths. With the Trail-Hoist (combination trailer and lifting device), the Tote-All can be easily moved from one job to another and delivery end of conveyor raised to desired height with hydraulic lifting device. Get full details on the standard Tote-All for all round foundry use or the new lightweight Zephyr model which may be used for handling sand or annealing coal.

Photo at left shows Tote-All Conveyor being used to unload a car of pig iron at a west coast foundry. Tote-Alls are used for many jobs at foundries—handles bulk material up to 14 in. top size. Material Movement Industries, 310 S. Michigan Avenue, Chicago 4, Ill.

WRITE FOR BULLETIN F

material movement industries

. . . for lowest cost material handling

(*Continued from page* 186)

new sand of a higher silica content, when the sand has an abnormal shrinkage, or stabilizing the sand's thermal expansion by using some combustible organic binder. For this, wood flour, cereal flour, rosin or seacoal may be used in combination with bentonites.

From this explanation it may be seen that the sand problems in connection with the use of the montmorillonite clays are: thorough mixing, closer limits for moisture control and the necessity for using a second material to reduce the natural expansion during heating. In many of our present foundry applications, this control is justifiable and to foundrymen wishing to adopt this will come a sand which works with a lower total moisture and greater toughness than with any other type of bonding clay.

Seacoal and Combustible Binders—One common application of this class of sand binders is mentioned in the above explanation for control of sand expansion. Since they are all combustible at temperatures below 1200 F, none of them can be classed as giving high temperature strength to the sand mixture. The only binder of this class which might have a medium temperature strength is pitch binder. These binders are used in cores and molding sand, to improve the working of the sand by adding either green strength, dry strength or toughness, as is the use of cereal binders for greater green strength, and the application of rosin, dextrine, lignin, molasses, core oil, pitch and gilsonite for hardness after baking.

For the reduction of hot strength and improvement of collapsibility, add such cellulose fillers as wood flour and pulverized plant fiber. Seacoal in sand mixtures seems to possess none of these corrective properties. Its accepted usage in both iron and malleable molding sand is for the express purpose of generating a reducing mold atmosphere and by so doing deposit upon the mold surface a layer of amorphous carbon. This and the reduction of sand expansion are the justifiable reasons for the use of seacoal.

These combustible binders are all potential trouble makers for foundrymen unless judgment is exercised in their usage and they are correctly chosen for

(*Concluded on page* 190)

THE FOUNDRY Index Ready

The index to Volume 74 of THE FOUNDRY, listing by title, subject matter and author the editorial material published during 1946, is available for distribution. Subscribers may obtain copies on request.

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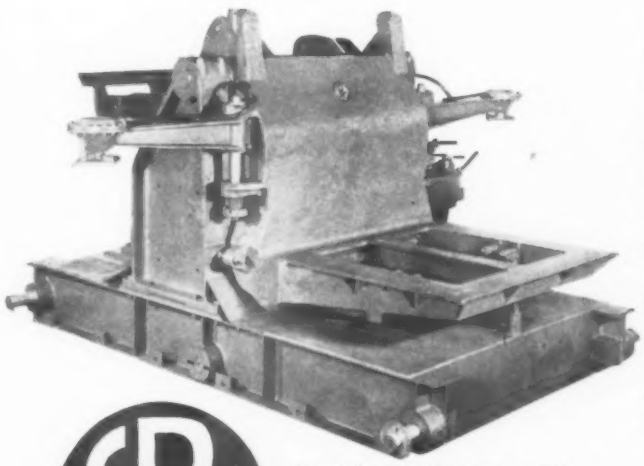
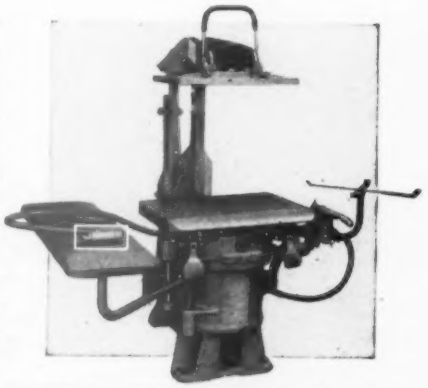


Special portable SPO Rockover Draw Machine for large slinger-rammed molds.

SPO gives you production and accuracy, plus long, trouble-free service, by insisting upon simplicity of design. This is true, whether of the big rockover at the left, the less formidable jolt squeezer at the right, the models and sizes in between, or the small vibrator which is still so important a factor in satisfactory operation.



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(*Concluded from page* 188)

the specific job which they are intended to do. Seacoal perhaps stands at the top of the list. Seacoal while capable of improving casting surface finish often has been the one material responsible for destroying finish. The problem lies not in the use of seacoal but in the proper selection of the correct grade of fineness to use. The following general classification is furnished by one large producer of seacoal:

SEACOAL CLASSIFIED BY GRADES

Grades	Approximate Total Per Cent On and Above 100 Mesh Per Cent	Through 200 Mesh Per Cent
C—Coarse	57	28
Medium	51	34
Fine	41	40
D—Coarse	15	56
Medium	12	60
Fine	10	65
E—Coarse	2.0	82
Medium	1.5	88
Fine	0.5	94
Bolted seacoal	0.0	97

The coarser grades of seacoal, as given, have but a few justified applications in foundry sands, in the author's opinion. There are examples on file where the seacoal has been found to have a large portion of its grain equal to or larger than the grains of the facing sand with which it was mixed (Fig. 2, 3). This practice tends to destroy finish and makes for mold drop-outs, run-outs and blow-holes. This is a problem to which iron and malleable foundrymen can give attention as a means of reducing production losses.

Trouble makers in the coreroom are both cereal flours and core oils. Here the trouble lies too often in the excessive use of either of these materials. It is an established fact in the author's mind that core sand mixtures containing in excess of one part cereal to 20 parts sand, trouble will be had somewhere along the line from core gas. The problem may not come from a low quality of cereal but in the way in which it is being used. If greater bond is necessary in the core sand than can be had by this cereal-sand ratio, then other nongas forming binders should supplement the cereal binder in the mixture. Core problems are many but foundrymen can do much to eliminate core gas troubles by keeping cereal binders below 1¼ per cent by weight of any sand mixture.

Core oil, one of the simplest in its functions of all sand binders, often is a hidden problem in a foundry. Brief explanation can be given this problem, for core oils either have it or do not have it and the "it" applies to the "ability of the core to bake out uniformly throughout." A simple cube block test (fig. 1) was developed by J. B. Harjie, Micronized Pigments Inc., and the author in his laboratory (Fig. 4) which in testing of sand-oil-water mixtures shows this to be the most important test of a core oil. The problems common to an incompletely baked core are core blows, core scabs and metal penetration. Too often these apparent troubles are believed to be a result of poor baking when in reality it would be better to look at the composition of the core oil.

Core Oil Chemical Definitions

Acid Number: The number of milligrams of potassium hydr xide required to neutralize the free fatty acids of one gram of an oil. The acid value of a core oil is considered a means to determine the presence of rosin in a core oil.

Saponification Number: The number of milligrams of postassium hydroxide required to saponify one gram of oil is known as the saponification value. The saponification value of a core oil is considered a useful index in judging the oil's ability to bake thoroughly and resist moisture reabsorption.

Iodine Number: The number of grams of iodine absorbed by 100 grams of the oil's fatty substances. This represents the ability of an oil to oxidize. The iodine value of a core oil indicates the extent to which it may be an oxidizing type of oil.

One test foundrymen can easily make on their cores is to open a green sand mold after several hours sitting on the floor and inspect the cores which are removed from this mold. It they are hard and have retained their strength, he has little to be concerned about his core practice, but if these cores are wet and soggy, here may be the cause of further losses in production due to hidden sand problems.

Of the combustible types of binders, two are used in core and molding sand mixtures which resist moisture absorption more than others. These are the rosins and pitch type binders, both water repellent in nature. Most of the other binders are to a more or less degree weakened from moisture absorption. Thus, if a foundryman is faced with dampness due to conditions in his foundry, he can do well to eliminate one more sand problem by redrying cores and molds before setting and closing.

Sand problems are so much a part of many foundry operations that we have grown up to see the forest and have overlooked the separate branches of the trees. Every foundryman has his problems in sand, this we know is true, but when these become of such magnitude that they decrease foundry production it is time to look for the reason, and who knows but that there might be several.

Foundry Moves Into Quonset Plant

RAY CALDWELL CO., 1841 LeMoyne Ave., Syracuse, N. Y., specializing in job casting of brass and aluminum, is now installed in its new location. The Quonset type building of the new foundry is constructed without supporting cross beams. Its smooth half circle interior greatly reduces the hazards of dust collection. Instead of the customary monitor system, large fans at either end of the building satisfactorily handle ventilation.

Ten molder's benches are accommodated in the 40 x 160 ft structure. Plant equipment includes one 1000-lb furnace and two 500-lb furnaces, all coke fired.

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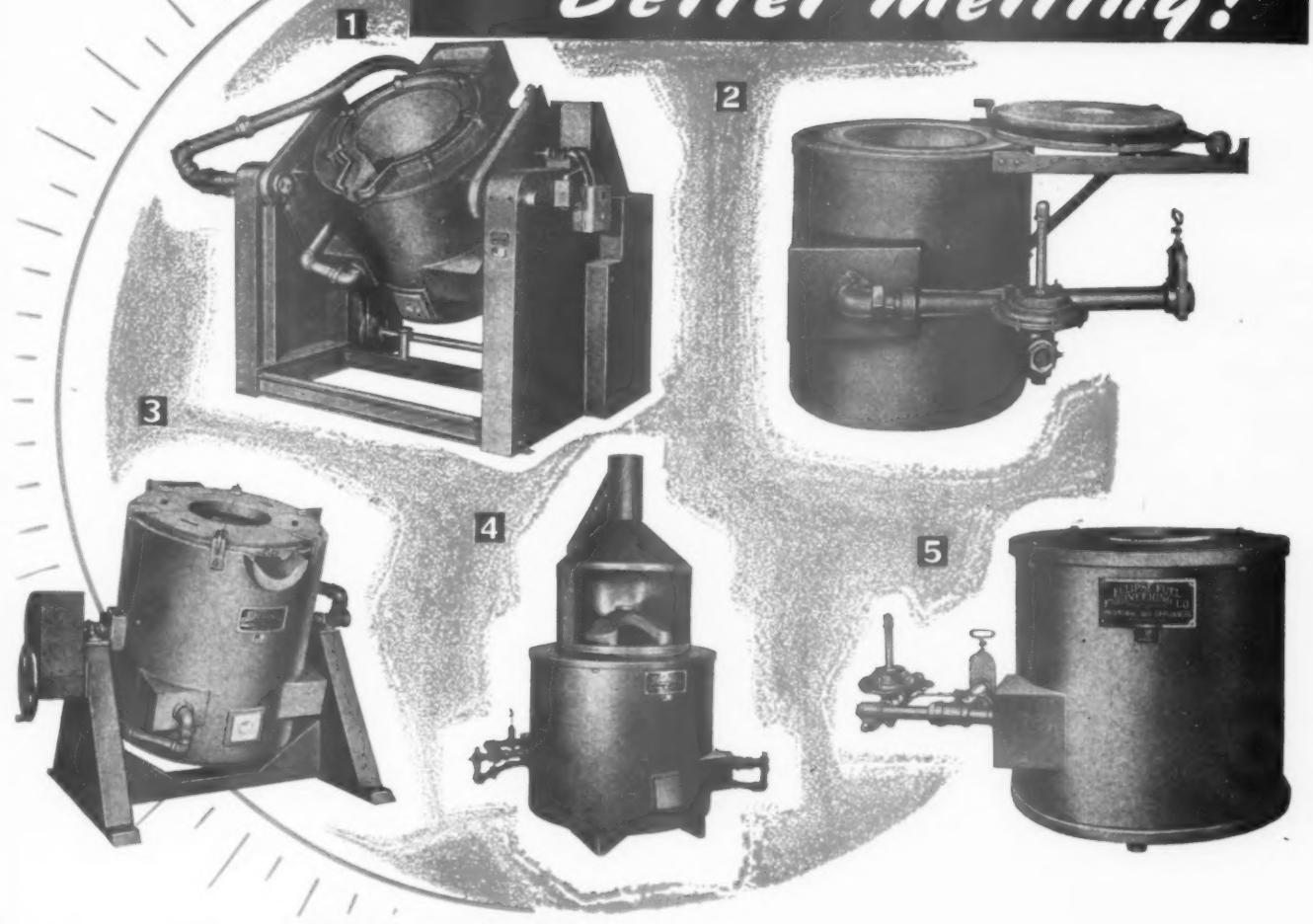

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3 "HT" Muffle Type Hand-Tilt Furnace for melting Aluminum and Brass. Supplied also in Semi-muffler and Open type.

4 Magnesium Sulphur Dome Melting Furnaces with protective atmosphere over bath area.

5 Aluminum Melting Furnace especially designed for aluminum die casting work. Furnished in 150 to 675 lb. crucible sizes.

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The adventures of BILL

By PAT DWYER

Drawings by RICHEY

A RECENT story in a newspaper about a soldier who lost his memory in World War I, wandered out of a hospital and wound up in a little foreign village where he married a girl and raised a family, suggested to Bill the possibility that many men marked *missing* in the official reports may be, as he expressed it, in the same boat. In his opinion, this was all right for single men, but decidedly awkward for another lad if wife No. 1 and half a dozen young olive branches nosed him out some day, produced the lines and the wedding ring and put the important question: "Well, here we are and you had better think fast Hon. What are you going to do about it?" Bill seemed to think that question or, more properly speaking, a satisfactory answer rated slightly higher than any in the usual $64 class.

From a superficial viewpoint I was inclined to agree with him. However, taking the broad view which characterizes we, or us, men of affairs, I suggested that instead of trying to think fast—a manifest impossibility for a man in his condition—the most logical solution of the problem, was for the hero to hop a freight train, bus or truck and just naturally disappear again. Seemed to me the Good Book has something to say about the utter impossibility of trying to serve two masters. I admitted the story might be true, but on the other or left hand it might represent the fanciful mental flight of a bored reporter who was expected to fill a certain amount of space each day. I further pointed out to Bill that the basic idea was older than either of us or, for that matter, both of us together. It crops up regularly in stories, plays and pictures. Usually one wife conveniently dies shortly after the denouement. The hero falls down a manhole or is hit on the head with a large, blunt instrument or a set of brass knuckles. He regains his memory and, in the last page of the book, the last act of the play, or the last reel of the picture, he grabs the surviving wife and starts off on a honeymoon while the author gathers up a few loose ends and hums a stave or two from "The Voice That Breathes Over Eden."

"Well," Bill said, "I'll tell you. Maybe you are right and then again—and this is the long end of the bet—maybe you are teetotally and everlastingly wrong. As Lem Wotisisname, in the late Chic Sales' highly technical and scientific monograph on certain phases of early American architecture, had a habit of saying, 'I'll tell you why.'

"While chatting with an old friend recently he told me of an incident that happened while he was on a trip through the state of New York. I might twist the story around and say all the following happened to me, except for two very good reasons. The first is that I have no patience with people with a craving for the limelight, who always pull off that trick. The second reason is that strangers do not pick me out as a suitable receptacle in which to spill their confidences and troubles. This friend of mine is just the opposite. He is short and stout and has the mild, benevolent type of face one usually associates with an archbishop, or one of the better fed saints in the upper and exclusive circles. I shall call him John, because that is his name, but I shall substitute imaginary names for people and places in the story to eliminate any possible source of embarrassment in the event you should try to corkscrew it into a story of some kind and have it published.

"While seated on an over-stuffed couch one night in a hotel lobby, John noted a wabbly gent yawing and tacking in a more or less random manner across the floor in his direction. Finally he plopped down alongside John, and the reek of his breath would have curled John's hair —if he had any.

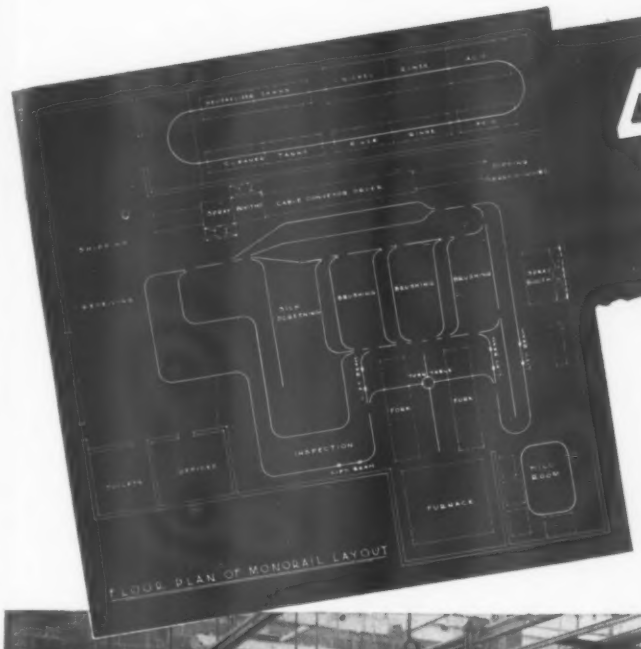
" 'Very heavy weather,' he remarked in a friendly, chatty manner. 'Dunno as I ever seen any heavier. Should be hand lines across this here deck. Keep a man from being washed overboard. Old sea-dog. Across ocean seven times. No. Take that back. Only six times. If I had crossed seven times, I'd be over there yet, hey? Stick to the truth. That's me every time. No need to tell you. Old sailor like myself. Spotted you, minute I clapped the old peepers on you. Wot ye say yer name wuz?'

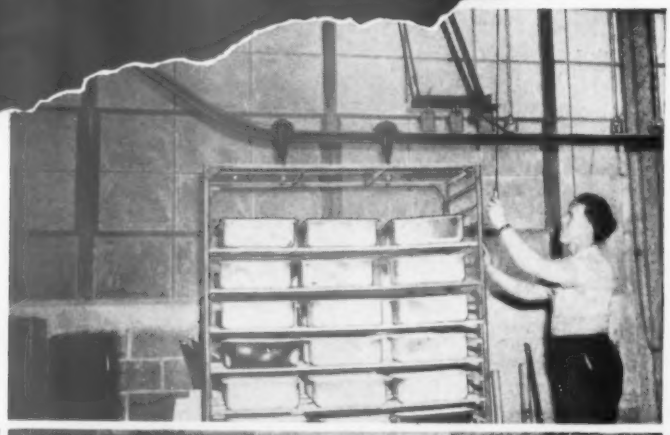
(*Continued on page* 194)

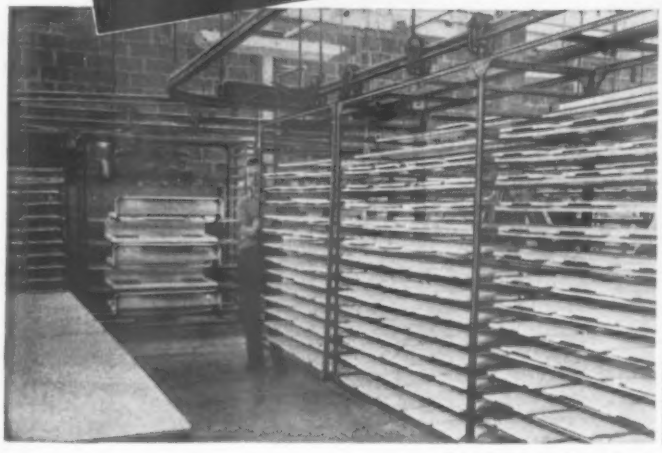
What's in a name? A breath by any other name would knock 'em dead at 10 ft

From Stamping to Finished Ware

48 HOURS







(Finishfotos—Courtesy Dana Chase Publications)

Compactness and a steady flow of material were considered essential in this porcelain enamel ware and parts plant. The American MonoRail system over which all ware is handled, is compact, avoids bottlenecks and assures 48 hours turnover from raw stamping to finished ware.

American MonoRail equipment serves each operation. Flexible arrangement permits continuous and prompt flow of ware through all departments. An unusual feature is shown in top photo where a simple air device lifts racks from one level to another, permitting easier loading and unloading. In this plant, like hundreds of others, American MonoRail equipment tends to integrate entire operations.

An American MonoRail Engineer may be able to show you how to speed up your operations with no sacrifice to quality and with marked savings. We invite your inquiry.

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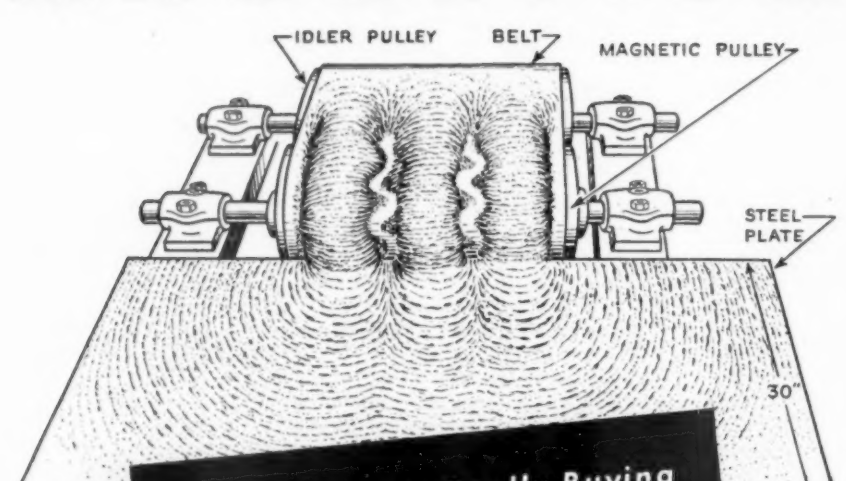
"Picture" of MAGNETISM



—What You are Really Buying When You Buy a Magnetic Pulley

The above illustration was made from a photograph of the pattern formed by iron filings introduced into the magnetic field surrounding a Dings High Intensity Magnetic Pulley. Note that the filings are influenced by the powerful magnetic lines of force at a distance of 30" from the pulley! You want the most powerful magnetic field and greatest iron-removing ability you can get for your magnetic separator dollar. Dings delivers you the maximum on this score by means of bronze coil covers, air-cooling and correct proportioning of steel and windings. For maximum separating power, select Dings. CATALOG 260 on request.

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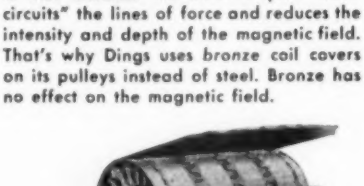


AIR COOLED

Heat increases magnet coil resistance. This reduces amperage which in turn decreases magnetic strength. Air cooling dissipates heat generated in the coil thereby providing cooler operation and *maximum magnetic strength.* (Cooling is accomplished by serrated radial openings and longitudinal openings. Rotation of the pulley plus action of belt create forced air circulation.)

(*Continued from page* 192)

"Just for fun, John told him his name was John Appleseed. Neptune grabbed him by the hand and shook it.

" 'Old Johnny Appleseed himself in person, hey? Boy, I often heard my grandfather talk about you back in Ohio. Certainly glad to meet you Mr. Apple-pie—'

" 'The name is Appleseed.'

" 'All right with me Johnny. You can change your name as often as you like, more often in fact than you change your shirt. Still I can't see any necessity. Apple Dumpling is a good name. Good enough to eat. How's that Mr. Dumpling?'

"Listen. The name is Appleseed—'

" 'Sure. Sure. I know. Your maiden name before you were married. Now that's settled and we are all old friends and shipmates, you might as well know my name. My name is—'

"And there he stuck between heaven and earth like Mahomet's coffin. He could not think of his name. He snapped the thumb and finger on one hand and then on the other. He cracked his finger joints, a loathsome trick I have not seen for years, but which even as a boy always set my teeth on edge. Fortunately the pie-eyed gent did not start biting his nails. As the boys say down in the shop, that would have been the final payoff.

"After brooding for a while with his head in his hands he came up beaming. 'Deepdish,' says he, 'I got it—'

" 'The name,' John explained calmly, 'is not Deepdish. It is Appleseed.'

" 'I wish you would stick to one name and stop hopping from one to another like a grasshopper with St. Vitus dance. Applejack is a good old name. No need to be ashamed of it. Very funny thing. You have half dozen names and I have none. Something rotten in state of Denmark. Eureka!' he says, snapping the finger and thumb of both hands simultaneously. 'Like the fella in the bathtub I have the answer to the name problem. You know the Municipal Court judge in Apahauki?'

"John regretted that he did not have that honor.

" 'Too bad. That's my father. Same name as mine. If you knew him, you would know me. Well now, le's see. Do you know the congressman from Lilliputianville? That is one of my brothers. Of course we have the same family name. You don't know him hey? Tell you what I'll do. I'll give you one more chance. Do you know the warden in the Algonquin penitentiary over here on the other side of town? He is a cousin on my father's side and naturally the name is the same as mine. You say you don't know him? Applejack I am kind

(*Continued on page* 196)

COST CUTTER

The ROYER Sand Separator and Blender

Better Sand Conditioning Means Better Castings

The Royer Sand Separator and Blender assures ideal sand conditioning—over 7,500 installations have proved this fact. Open, even-textured, trash-free sand discharged by the Royer minimizes possibility of casting-surface defects, scabs, blows, runouts, drops, and pattern sliding.

The Royer does a complete job . . . only labor is shoveling materials into hopper. It removes refuse, breaks up lumps and clay balls, blends new and old sand, mixes in bond, opens sand for gas escape, increases permeability 10 to 20 points, distributes moisture evenly, cools and double aerates sand.

Sand Combing Belt, shown in part above, consists of staggered rows of tempered chrome molybdenum steel sprigs mounted on tough, composition endless belt. Sprigs comb, tumble, and aerate sand to proper consistency and discharge at top by centrifugal force. Capacities available from 4 to 25 tons per hour. Send for Bulletin 744.

- Slash Discount and Discard Losses
- Increase Sand Output per Man-Hour
- Decrease New Sand Requirements
- Lower Cleaning Room Costs
- Reduce Facing Sand Requirements
- Eliminate or Lower Riddling Time

Utica Steam Engine & Boiler Works, Utica, N. Y., do all their sand cutting at night with a Royer Model NC-4.

ROYER

FOREMOST IN SAND CONDITIONING EQUIPMENT

ROYER FOUNDRY & MACHINE CO.

KINGSTON, PENNSYLVANIA

ROOM FOR ALL at a Bradley Washfountain

No crowding around waiting turns to wash and clean up when Bradleys are handy. One Washfountain serves up to 10 persons comfortably, quickly, with maximum sanitation and health protection. Each user is served an individual supply of clean, *running* water from a central sprayhead. Water is drained off as used . . . collections of contaminating dirt avoided.

Bradleys, with handy foot-control and self-flushing bowls, represent the ultimate in sanitary group-washing fixtures.

Many concerns also report immediate savings in water consumption while further economies are realized because one Bradley sprayhead eliminates 16 to 20 faucets, and one Washfountain replaces 8 to 10 "single-person" wash basins.

These and other features, such as ease of installation, savings in upkeep, durable construction, and foot-control make Bradley America's *first* name in modern, sanitary, group-washing fixtures. BRADLEY WASHFOUNTAIN CO., 2217 W. Michigan Street, Milwaukee 1, Wis.

Bradleys are nationally distributed through plumbing jobbers

BRADLEY *washfountains*

Write for new illustrated Booklet 4308 and Washroom Survey Sheet.

(*Continued from page* 194)

of disappointed in you. I give you three chances to answer a simple, elementary question, and what do you do? You fall down flat.

"John graciously admitted that he might be dumb, but at least he could name his own name which appeared to be more than a certain party in the immediate vicinity could do.

" 'No fair,' says the lad. 'No fair. You have half a dozen names to pick from, while I have only one. Must be a miss-deal some place. Le's shuffle the cards again. I knew my name yesterday and with the blessing of Providence I shall know it again tomorrow, perhaps before that time if I can get another drink. I don't know what I'd do if I had a half

When shall we three meet again?

dozen names and forgot 'em all.'

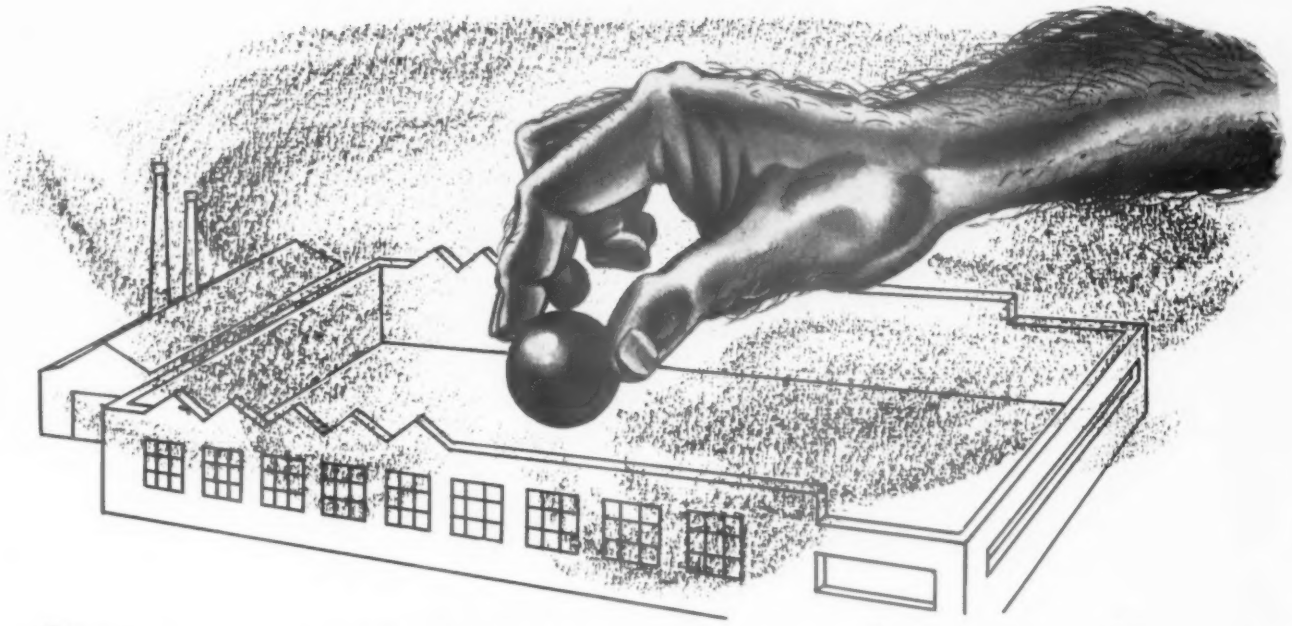
"He staggered to his feet and held out one hand.

" 'Goodbye old pal,' says he. "Glad I met you even if you did turn out to be a broken reed. Three balls over the plate and you missed every one of 'em. Let this be a lesson to you. By the way, what did you say your name is?'

"Apparently," said Bill, "he did not have as much faith in me as a foreign foundryman who wrote me recently. He is contemplating the erection and operation of a plant for making cast iron soil pipe and fittings. He would appreciate information on the methods and equipment employed in the United States for producing this class of castings.

"In my reply I pointed out that the manufacture of soil pipe and fittings is one of the highly specialized branches of the foundry industry. In addition to the mechanical and technical features I directed attention to the fact that these castings are made in great volume, under mass production methods and sold at a

(*Continued on page* 198)



Dust can *BLACK BALL* your production flow

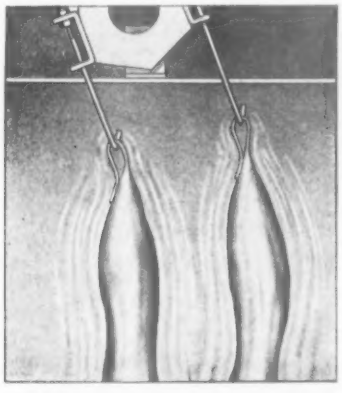
By invading every nook and cranny of a plant, dust causes equipment wear and breakdowns, increases maintenance costs, sets up inefficient working conditions, disturbs employee relations, slows down production.

When such conditions prevail, call in a trouble-shooter with a nose for handling the situation in a practical, economical way. You will find *American* an ideal adviser on problems of this kind because:

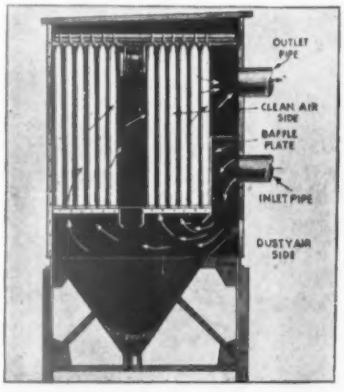
(1) The American Dust and Fume Control Division is staffed with competent engineers of long experience in the foundry industry .... men who have the "know-how" to give you expert counsel on dust problems applying to an entire plant or a single machine.

(2) The *American* Dustube cloth bag type Collector combines highly efficient operation with a simplicity of design that results in the lowest operating and maintenance costs yet obtained in a cloth type Collector.

Illustrating the ease with which Dustube filter tubes can be installed and replaced. In a contest held at a recent industrial show, hundreds of contestants averaged less than 15 seconds per tube in handling this operation.



Shaking the filter tubes while deflated cleans the cloth down to a lower backpressure than any other method.



Cross-section view of Dustube showing simplicity of design. Tubes can be installed by one man without using a single tool.

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WHEELABRATOR & EQUIPMENT CORP.
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MANGANESE BRONZE
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Manganese Bronze with maximum physical properties can be produced at low cost through the use of "FALLS" NO. 21 MANGANESE BRONZE HARDENER.

Complete details are available in a special bulletin.

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NIAGARA FALLS
Smelting & Refining Division
Continental-United Industries Co., Inc.
BUFFALO 17, NEW YORK

(*Continued from page* 196)

price that no small independent foundry could hope to meet.

"Soil pipe castings are made by several methods depending principally on the volume of production. Elaborate mechanical equipment is employed where the volume is large enough to absorb the cost in a reasonable period. In many shops the molds are still rammed by hand. In others sandslingers are employed. In a third method the molds are rammed on special type machines. All these methods have been described many times in THE FOUNDRY, in long illustrated articles and on the *Question and Answer* pages. Methods and equipment employed in a prominent Canadian foundry where the molds are made according to the third method and poured continuously throughout the day, were described in a two-part article published in the June and July, 1946, issues. The following brief description covers the hand molding method. Many features are common to all methods.

"Straight pipe up to and including 5-in. diam are molded two in a flask and poured through four sprues connected to shallow gates at the joint and between the two pipes. The gates form part of the pattern equipment and are detachable. A number of drags are rammed first. Then the gate patterns are removed and a corresponding number of copes are rammed on the same pattern setup. Formerly four hand ladles were employed to pour the iron. Modern practice favors the use of a long ladle with four spouts in line and spaced to correspond with four sprues equally spaced in a straight line along the center of the cope. The molds are laid down in a straight line on rails or parallel concrete foundations in the floor to facilitate passage of the ladle suspended from a monorail hoist.

"Cast iron flasks are designed to hold a minimum amount of sand. The slides slant away from the joint. Cope and drag are equipped with one or two cross bars and no bottom boards are needed. Molds are rammed on an iron pattern plate mounted on four wheels to follow the receding sand pile. Two whole pipe patterns which have been turned true in the lathe and polished, are mounted in such a manner that the upper surface of the pattern plate—in this case also a stripping plate—coincides with a longitudinal center line on the pipe patterns. A toggle and lever combination drops the patterns approximately 1 in., before cope or drag is lifted. A reverse pull on the hand lever raises the patterns again to ramming position.

"Cores for the straight pipes are formed by allowing a thin stream of green sand from an overhead hopper to fall on a steel or cast iron core barrel revolved

either by hand or by a modified form of lathe started and stopped by a foot treadle. The arbor or barrel is pierced by vent holes, the number and location depending on the character of the sand. A long strike arranged longitudinally in a suitable manner regulates the thickness of sand on the barrel.

"Patterns for the special fittings, particularly for the larger sizes, are exact duplicates plus contraction allowance for the castings to be made. The pattern is split along a horizontal center line and fitted with dowel pins. Mold and core are made at the same time. In the smaller size, split patterns provided with core prints are mounted on plates attached to a plain squeezer machine. Green sand cores are made in hinged coreboxes. The greatest care and accuracy are required in fitting up flasks, patterns, coreboxes and arbors. A suitable grade of sand, fairly close but permeable, must be employed in making the cores."

GAS POROSITY IN ALUMINUM ALLOYS

(*Continued from page* 89)

as fuel, and the porosity thus formed is very difficult to remove from the metal. It seems as though something in the products of combustion (probably sulphur) acts as a catalyst and promotes hydrogen pickup.

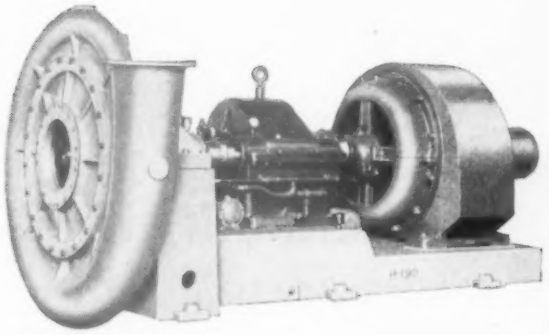
The furnace flame should be kept as nearly neutral as possible, or slightly oxidizing, never reducing. A sharp blue or green flame is usually an indication of good combustion and a neutral or slightly oxidizing atmosphere. A yellow or orange flame usually indicates faulty combustion and a reducing atmosphere. An easy way to check flame condition is to hold a cold piece of zinc in the flame. If it becomes black, the flame is reducing. If it stays bright, the flame is neutral. If it has a slightly dull color, the flame is oxidizing. Another quick rule-of-thumb method of checking flame condition is to throw in a block of soft pine wood. If it burns like an old straw stack, the flame is oxidizing.

Since reducing gases may also seep into the melt through the pot walls, the metal should be melted rapidly in order to have minimum time in the furnace. Melting in induction furnaces prevents gas pickup due to reducing gases resulting from fuel combustion.

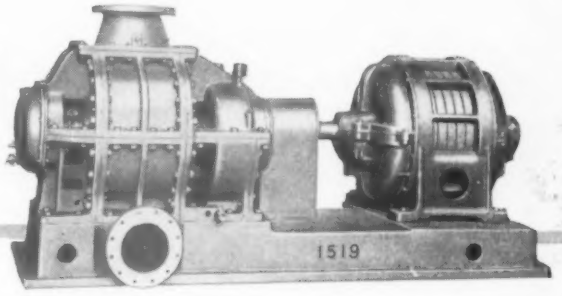
The higher the temperature of the molten aluminum, the greater its solubility for hydrogen. This means that overheating of the metal should be avoided. The metal should be heated only hot enough to pour the casting and

EQUALLY GOOD

at pushing



or pulling



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Whether it's a thimble of gas for a shop forge or a hurricane of air in a test-tunnel, R-C *dual-ability* can deliver it. This *dual-ability* comes from our capacity to design and build either Centrifugal or Rotary Positive equipment. We combine almost a century of experience with advanced engineering to meet the precise requirements of today's jobs. And, we welcome those difficult problems peculiar to tomorrow's planning.

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SO you must use what is available—

SO why not call

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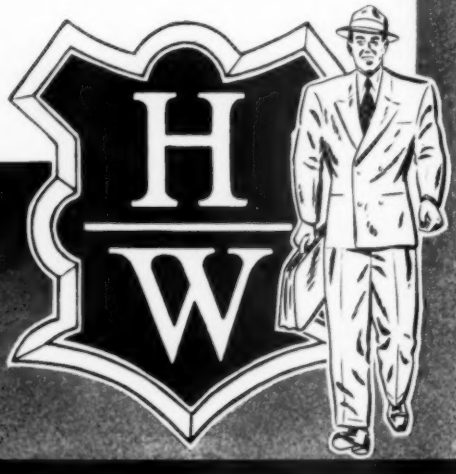
For cleaning castings faster, use "NATIONAL" SHOT GRIT



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usually should not exceed 1450 F. This requires close temperature control and necessitates the use of pyrometers not only during pouring, but during melting as well. The most reliable types of pyrometers for aluminum have closed-end thermocouples. They can be obtained in portable makes which permit temperature checking anywhere in the foundry.

If ingots are placed on top of the furnace or allowed to extend into the furnace flame, gas is likely to be absorbed and carried into the melt. As the ingot heats it expands, thus making available more pore space for absorption of gases. As the metal approaches the melting point droplets form which have an oxide coating, and if the metal has absorbed furnace gases these will be sealed in by the oxide film and will be carried into the melt.

Metal Absorbs Water

If metal has been allowed to stand exposed to the weather it will absorb water, and the thin oxide coat which forms will then seal in the water. The ingot may appear to be dry, but if placed in a pot of molten metal will result in an explosion in addition to introducing hydrogen into the melt. Such ingot should be held at 900 F for a few minutes before charging into the pot. The best and safest remedy, of course, is to store ingot indoors whenever possible.

Chips, turnings, borings or scrap which contain oil are a source of hydrogen if introduced into the melting pot. Such material should be degreased before using, or preferably melted, properly cleaned and refined, and poured into ingot to be remelted before pouring into castings.

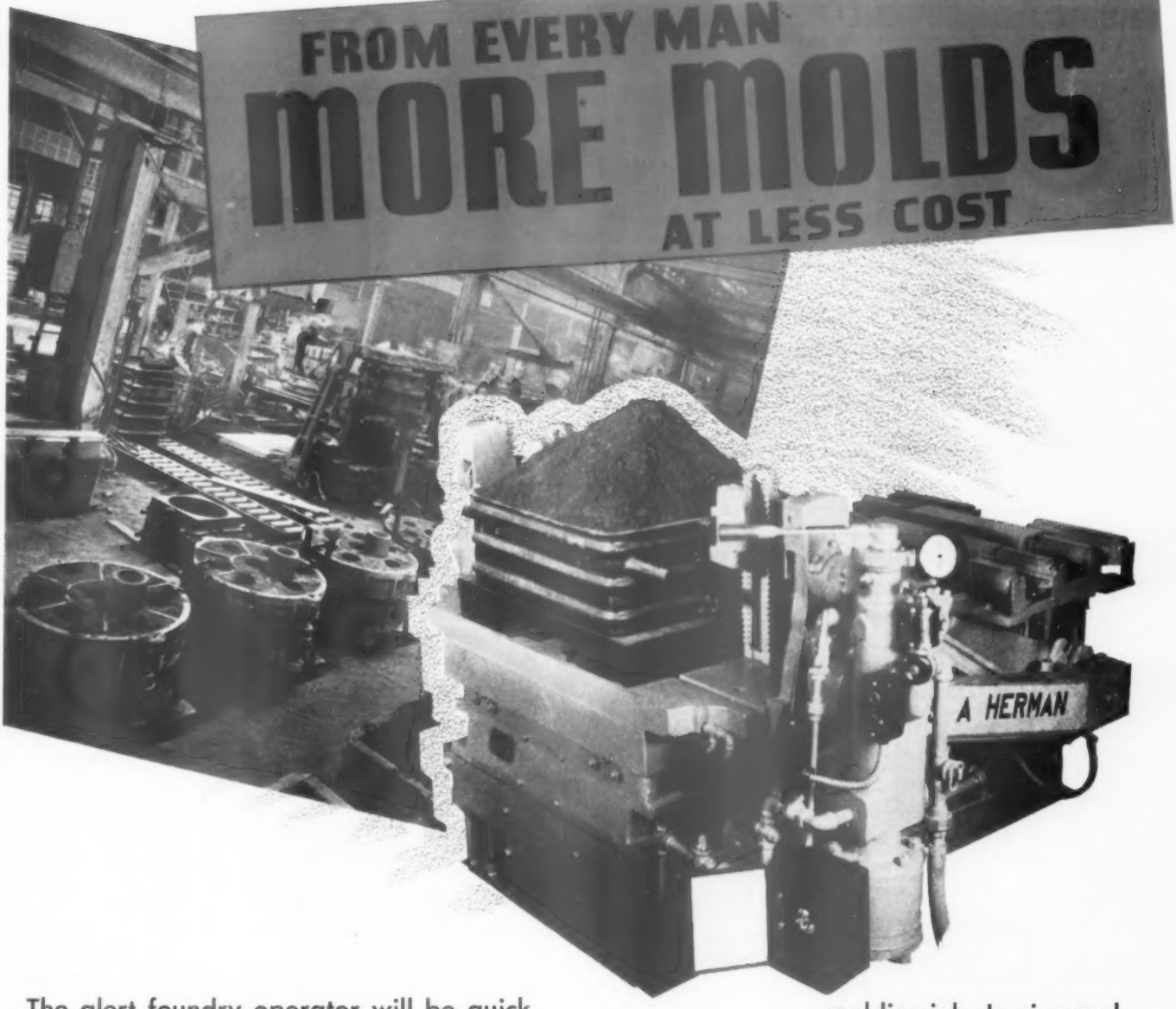
The presence of water vapor in the air has a profound influence on the presence of pinhole porosity. As humidity increases, pinhole porosity increases.

Any moisture absorbed by the melt will be broken down into oxygen and hydrogen which is dissolved by the molten metal and later thrown out of solution during cooling. It is the absolute humidity which is important, not the relative humidity. Absolute humidity is the actual amount of water present in the air and may be designated as the grains of moisture per cubic foot of air. Relative humidity is the ratio of the amount of water present in the air to the amount which would be present if the air were saturated with moisture at that temperature, and is designated in per cent.

Since air will hold more water when it is warm than when it is cool, it can be seen that air at 40 F with a relative humidity of 40 per cent will actually

(*Continued on page* 203)

FROM EVERY MAN MORE MOLDS AT LESS COST



The alert foundry operator will be quick to recognize the fact that high speed equipment, producing *uniformly perfect* molds, will enable his molders to put out more molds at lower cost per man-hour. He will also recognize that from uniformly perfect molds he can produce castings of *uniformly high quality*.

Herman Molding Equipment will give high speed production of uniformly perfect molds at low cost. There is a complete range of Herman Equipment to meet any type of molding job. Jarring and Jarr Stripping Machines are available in any size or capacity up to 140,000 pounds. Jarr Roll-Over and Pattern Drawing Machines are available from 750 pounds to 40,000 pounds roll-over capacity in Pitless or Pit Types. Independent Roll-over and Pattern Drawing Machines are also available for use with plain jarring machines you may now have in operation.

Get all the details. Ask an experienced Herman foundry engineer to call on you.

MOLDING HERMAN MACHINES

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.

The PATTERN SHOP

Pete the Pattern Maker says:

"The reason why truth is stranger than fiction is 'cause we hear so little of it."

The Master Dust Collector is a complete unit, sufficiently large to collect dust from saws, large disc grinders, or any other machines producing metal or wood dust other than shavings.

This equipment is very easily installed and does a very efficient job of dust collecting without dissipating heat from the room. The exhaust dust can be piped to any outlet up to 100 feet away.

Don't let dusty, dirty air reduce employee efficiency, and lower the standards and volume of your products. Order MASTER Dust Collectors to meet your needs. Low cost. Immediate delivery. Write for complete list of specifications and prices.

MASTER Fillet Cement

This is a quick, new cement for applying Bull's Eye, Leather or Wood fillet to wood or metal patterns. It is easier to apply and encourages better, neater work. Sand will not stick to edges of fillet where MASTER Fillet Cement has been used, assuring smoother castings and more time saved in cleaning room. This glue is impervious to the moisture of foundry sand and core oil. Will not curl the edges of wood fillet. Write for prices on MASTER Fillet Cement and Cement Thinner now.

Distinctive Monograms

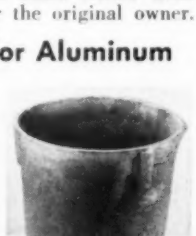
Your monogram on your casting is always a mark of distinction, and is an effective advertisement for you wherever your castings are used.

We not only make the regular line of pattern letters and figures but also make anything in the way of special foundry monograms and trade marks, as well as complete alphabets and figures of special design. These can be cast in hard or soft white metal, aluminum or brass.

Mail us your drawing or give us an idea of what you require and we will quote you on the finished product cast from either white metal or brass. Whenever we manufacture special designed letters from your blueprints,

we consider the design to be your exclusive property and will not make letters from the design, except for the original owner.

Melting Pots for Aluminum



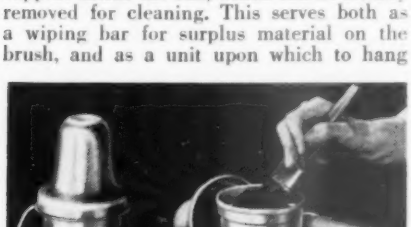
The use of cast aluminum is growing constantly, and its production in the foundry should be made as efficient as possible. The Kindt-Collins Company has developed a new aluminum melting pot of 50 lbs. capacity, with several important features:

1. Scientifically designed and heavily constructed.
2. Normalized to prevent cracking.
3. Cast from special alloy, to obtain greatest life. 200 heats can be obtained from each pot under reasonable care.
4. Use of 2-man bale permits pouring of aluminum from same pot in which it was melted. This minimizes agitation, reduces porosity, and encourages better castings.

Write for prices on this new 50 pound capacity MASTER Aluminum Melting Pot.

MASTER Coating Containers

A handy, new container for a wide range of shop uses has just been announced by The Kindt-Collins Company. These are sturdy, handsome containers of heavy aluminum, built to stand plenty of abuse in daily shop service. A feature of the can is the crossbar support inside the can, which can be readily removed for cleaning. This serves both as a wiping bar for surplus material on the brush, and as a unit upon which to hang



the brush when it is not in use. The cone-shaped top fits snugly over the can, covering both the brush and the contents, preventing hardening and evaporation. The aluminum will not stain or discolor the contents of the can. This new container is available in one and two-quart sizes for varying needs requiring glues, coatings, etc. The cost of this new can is so reasonable that one or more can be supplied to every point in the shop where liquid materials must be applied by brush. Write for prices today, and plan to use these well-designed, sturdy, all-around containers for better efficiency.

MASTER Disc Cement

Here's a handy product that eliminates needless time lost in changing abrasive discs. MASTER Disc Cement permits easy disc changing, and encourages the quick application of new, efficient-cutting discs to replace worn, slow-cutting discs. It assures an absolutely *tight* bond on paper- or cloth-backed abrasives, but is not designed for heavy fibre-backed discs. Save time, save labor, save money—and get a better quality of cutting work—by using MASTER Disc Cement. Put up in one-quart containers only. Send your order for a trial can today.

New Literature

Gives details and specifications on new MASTER Aluminum Melting Furnace. Get this information now—for better quality of work at lower costs.

KINDT-COLLINS MASTER PRODUCTS

THE KINDT-COLLINS CO.

Everything for the Pattern Shop

12651 ELMWOOD AVE. • CLEVELAND 11, OHIO

(*Continued from page* 200)

contain less moisture than would air at 70 F with 40 per cent relative humidity. Thus, it is important to use absolute humidity figures. How this is arrived at is shown in Table 2. Two thermometers are mounted side by side, one having a dry bulb, the other a wet bulb. These thermometers are attached to a swiveled handle so they can be swung about in a circle (such an instrument is known as a sling psychrometer). When the instrument is swung in a circle the water evaporates from the wet bulb, and this evaporation cools the thermometer. The less moisture in the air the more moisture it will absorb from the wet bulb, the greater the evaporation, and the greater the temperature reduction, and consequently the lower the humidity of the air.

Readings of the dry and wet bulbs are recorded as shown in Table II. The difference between the two is noted. By referring to a relative humidity chart the relative humidity can be read, or by referring to an absolute humidity chart the actual moisture content can be obtained. Note that the greater the difference in bulb readings the lower the humidity of the air, and vice versa. Note also how rapidly humidity increases with slight differences in bulb readings.

Increase Pinhole Porosity

Table III shows the effect of humidity upon the occurrence and size of pinhole and also the effect of direct and indirect melting. The barrel furnace had flame impinging directly on metal, but in the tilting furnace the products of combustion were not in contact with the metal. In both cases pinhole porosity increased in severity as humidity increased.

The sample used to check these results is shown in Fig. 4. Fig. 3 is a sketch showing dimensions. A dry sand mold was used to eliminate the possibility of hydrogen pickup from green sand. The specimen was designed to provide adequate feeding so that shrinkage would not complicate the problem. The bottom 2 in. of the specimen was sawed off and the cross section machined with a sharp tool to reveal pinhole porosity. Then the machine cross section was ruled into squares and by use of low power magnification the holes per square inch were counted. Such a machined cross section is shown in Fig. 1.

Not only the effect of humidity during melting but also the effect of transferring metal from furnace to holding pots was noted. Specimens of A132 (Lo-ex alloy) were poured directly from the tilting pot after degassing, and again after the same metal had been trans-

(*Continued on page* 206)

YOU CAN PUT YOUR FOUNDRY ON A LOW-COST PRODUCTION BASIS USING STANDARD CONVEYORS

In nearly every phase of foundry work, where volume handling of flasks, molds, sand or castings becomes almost a full time job—Standard Conveyor Co. makes a conveyor that will lower your handling cost and make men available for productive work.

Investigate Standard Conveyors for foundry use—they can be used as small sections or complete systems to speed up handling in departments or throughout your plant. They can relieve congestion too!

Available in varying widths, weight carrying capacities and combinations — there's a Standard Conveyor to suit nearly every individual requirement. Send for this free booklet that shows applications and ideas for conveyors in foundries — ask for bulletin F-247.

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When molding's complete—loaded on conveyors—jobs move smoothly and quickly to next stop.

STORAGE

All lined up ready for pouring and moving to shake-out — and return to molders out of the way — yet ready for instant moving to molders, furnaces or pouring station.

POURING STATION

Neatly aligned, the pouring job is simplified — molds can be quickly moved out of the way for cooling and shakeout.

STANDARD *Gravity and Power* **CONVEYORS**

ENGINEERED FOR FASTER PRODUCTION

"All Federal Products Ar

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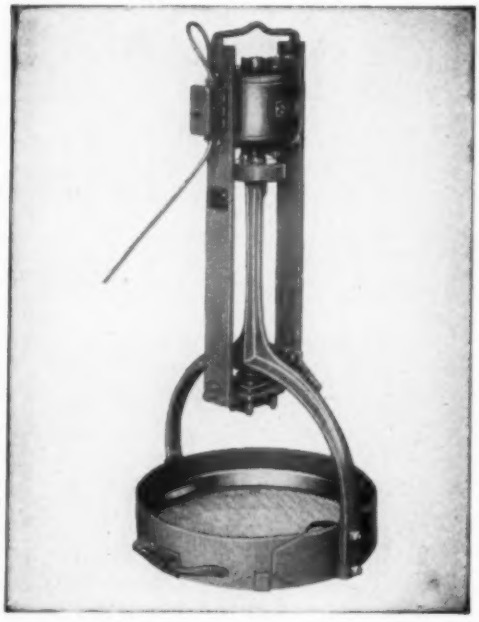

FEDERAL'S LOWE SIFTER

Save money by faster sifting, better sand conditioning with a Lowe Electric Sifter. Features: greater screening area, enclosed ball bearing motor, more shovelling room. Write for information. Prompt delivery.

FEDERAL JOLT MACHINES

Air operated, fool-proof jolt machines that ensure uniform cores. Sturdy cast iron construction with no external valves to wear out. Made in four sizes. Get our prices and deliveries.

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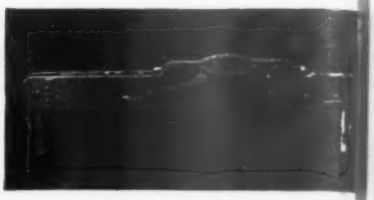
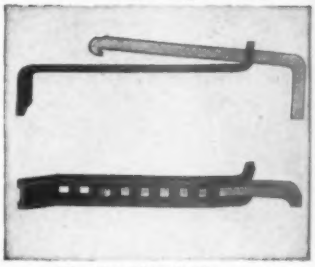


The "Lightning" Clamp



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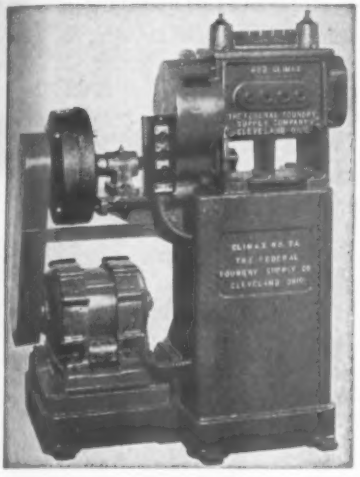

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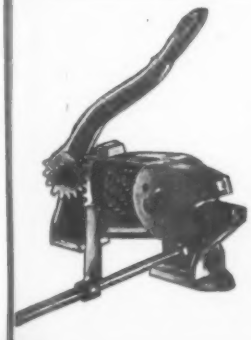

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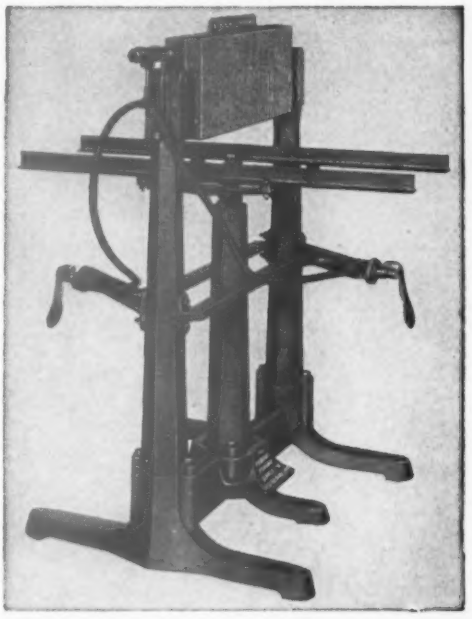

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(*Continued from page* 203)

ferred to the holding pot. When humidity was low (200 grains of water per cubic foot of air) little difference was seen, but when humidity was high (600 grains of water per cubic foot of air) pinhole porosity was much heavier in samples taken from the holding pot.

This shows that it is possible to pick up porosity during metal handling even though all possible care has been taken to produce metal free from gas in the melting pot. It is advisable, therefore, to see that as few metal transfers as possible are made. For the same reason the pouring ladle should be held as close as possible to the mold, and any transfer crucibles should be held as close as possible to melting furnace and holding pot when transferring metal.

If humidity is high, the metal should not be held too long in holding pots before pouring. Several times it was found that on days of high humidity the number of pinholes per square inch increased 50 per cent when metal was allowed to stand for one hour in a holding pot.

Chemical Composition—It has been found that chemical composition of the various alloys also has a great deal to do with the relative tendency to form pinhole porosity. It is difficult to entrap hydrogen in the form of pinholes in commercially pure aluminum. Nor do solid solution types of alloys readily entrap hydrogen to form pinholes. Eutectic alloys or those solidifying nearly, but not entirely, at constant temperature have a tendency to retain hydrogen in the form of pinholes. The author found this very true in the case of A132 (Lo-ex alloy) containing about 12 per cent silicon.

The tendency of eutectic alloy A132 (Lo-ex) to form pinholes is so pronounced that it is quite common to find pinhole porosity even in permanent mold castings made from this alloy. On the other hand, a solid solution alloy (40E) showed very little tendency to form pinholes, and unless severely overheated or deliberately gassed, pinhole porosity is seldom seen in such alloys.

The author also found that the presence of certain impurities will increase the tendency to entrap hydrogen in the form of pinholes. This work was done with A132 (Lo-ex alloy) also. Sometimes metal was encountered which had severe and large-sized pinhole porosity. None of the usual degassing methods eliminated the porosity. Spectrographic analyses showed the presence of calcium in many of these samples. To see whether this was connected in any way, a sample of metal with relatively high calcium content was diluted 50-50 with

(*Continued on page* 208)

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(*Continued from page* 206)

metal having no calcium. Half of this mixture was then diluted with metal having no calcium, and so on, until four such dilutions had been made. Castings and test specimens were poured from each batch. The pinhole progressively decreased in both castings and specimens as dilution increased and as calcium content decreased. The results indicated that calcium of over 0.02 per cent was likely to cause trouble in this alloy.

Spectrographic investigation indicated two possible sources of calcium. One was calcium-containing fluxes. The other, and greatest source, was certain types of silicon which were used to make the alloy. In such cases the only thing to do is to set close chemical control limits on undesirable impurities.

Gas porosity tends to be much lighter in small sections where solidification is faster. As total section thickness increases, all other factors being the same, the total volume, size and angularity of the pinholes increase. The same is true with increasing pouring temperatures. The total volume of pinholes, their size and number also increase with increasing gas contents of the melts.

In general, all other factors the same, pinhole porosity in aluminum base alloys is rounder and smaller the finer the grain.

Where the mold has AFA permeability of less than 15, the melt may generate enough mold gas pressure that the gas is able to penetrate into the melt in the mold before the metal solidifies and result in a concentration of pinholes near the surface of the casting. Higher sand permeability will relieve the pressure and eliminate this porosity.

Degassing—Assuming that all the preceding precautions have been observed and gas porosity still exists, what can be done to eliminate it?

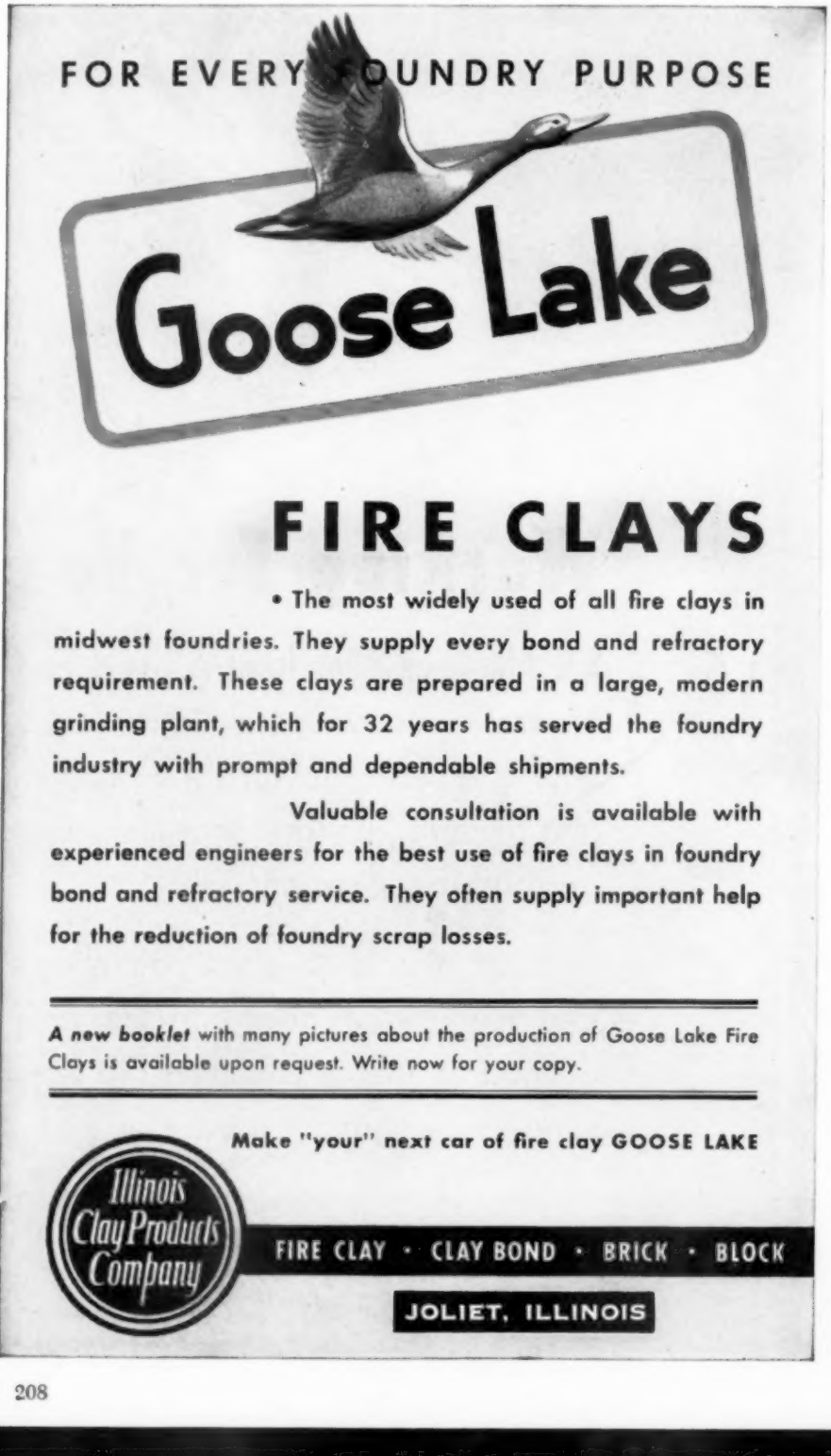
Since hydrogen is practically insoluble in solid aluminum, it has been found beneficial to cool the metal in the furnace and hold the metal in pasty condition for about 45 minutes to allow the gas to escape. The metal should then be allowed to freeze down to about 1100 F, and then heated rapidly to pouring temperature. However, these manipulations are not usually practical in a production foundry, they are costly, and sometimes are not entirely effective.

Degassing by fluxes is by far the cheapest and most satisfactory solution to the problem. This may be accomplished by either dry (salt) fluxes or by gaseous fluxes.

Dry salt fluxes are usually chlorides, fluorides, or combinations of the two. They are less effective than gas fluxes; however, in many cases hydogen pickup is insufficient to warrant the use of gaseous fluxes. Dry salt fluxes usually are most effective as a cover during melting. Best results seem to be obtained if about ¼ to ½ lb of flux is added for each 100 lb of metal. The author prefers to add the flux as soon as the first metal is molten. The flux will then ride on top of the melt as it rises. If flux is sprinkled in the bottom of the pot or on the ingots it may become trapped in the metal during melting and form hard lumps. If a heel of metal is left in the furnace the flux may be added on the surface of the heel and will thus protect the metal as the melt rises. When metal is ready to be poured the flux should be stirred into the bath and then the dross skimmed off.

Such fluxes usually are not effective if stirred into the bath at temperature under 1300 F. The dross should form as a dry powder and separate easily from the metal. If the flux does not dissociate at a temperature close to 1300 F, then another flux should be selected. Zinc chloride usually is avoided since it leaves zinc in the metal, picks up moisture from the air rapidly, is very corrosive on skin or clothing, and the fumes are often obnoxious. Some foundrymen (including

(*Continued on page* 210)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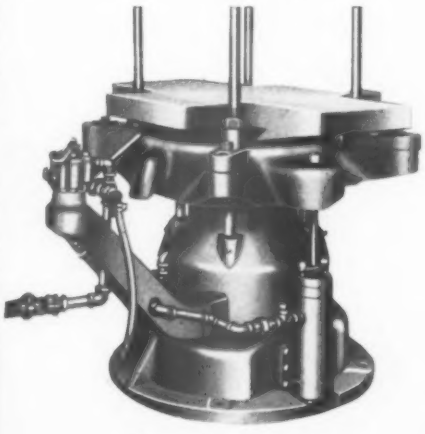
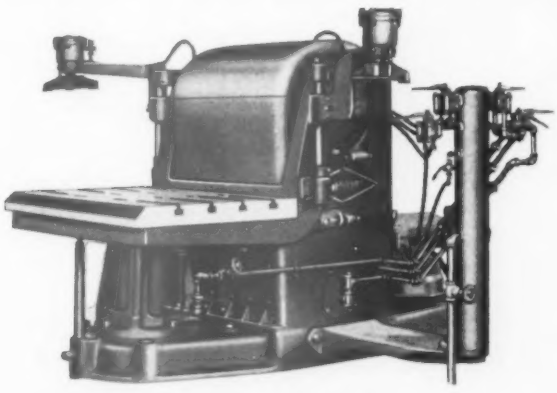


Davenport Jolt Pin Lift Model AJS (stationary)



Davenport Jolt Rollover Draw Model A

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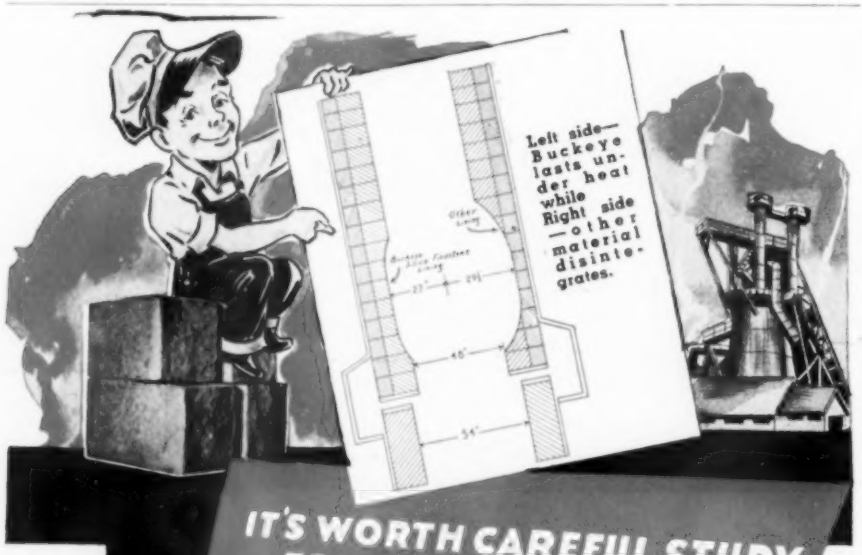
(*Continued from page 208*)

the author) prefer to avoid calcium-containing fluxes, also, since calcium quite often causes trouble if picked up by the metal. Sodium or ammonium base chlorides or fluorides usually are very satisfactory. Since most of these salts are hygroscopic they should be stored in cool, dry storage areas to prevent moisture pickup.

If the right alloy has been used and if melting and atmospheric conditions are favorable, no further fluxing may be necessary. However, in most cases if metal free of gas porosity is desired, further degassing usually is necessary.

Gaseous fluxes are not only more effective than dry salt fluxes, they are also cheaper. Gaseous fluxes usually contain nitrogen or chlorine. Regardless of which type is used care must be taken to see that the flux is oil pumped and free of water. There is a great deal of debate concerning the merits of both nitrogen and chlorine fluxes, and some places use both. The opinions expressed in this paper are those of the author and are based upon numerous tests using both types in a large number of different alloys.



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Nitrogen is an inert gas and its degassing action is generally supposed to be purely mechanical. It is believed that hydrogen will tend to diffuse into the nitrogen bubbles due to the low partial pressure inside the bubble, and dirt particles will become attached to the bubbles and rise to the surface of the melt with the nitrogen bubbles.

Chlorine, in addition to mechanical action, is believed to exert a chemical effect, lowering the viscosity of the bath and allowing easier escape of gases, or attacking and breaking down the tough films of aluminum oxide, thus permitting easier escape of gases which otherwise could not diffuse through the oxide skin. Free chlorine does not remain in the melt. Aluminum chloride is gaseous at the temperature of molten aluminum and escapes into the air.

Introduced Through Tube

Gaseous fluxes are introduced into the bath by means of metal, carbon or graphite tubes which extend to within about 2 in. of the bottom of the pot. The rate of gas flow should be adjusted so that a rolling motion of the bath is provided rather than violent agitation. The tubes vary in diameter from 1/2 to 1 in., and may have an open bottom or have the bottom plugged and holes drilled around the sides of the tube for a distance of several inches. The author prefers the perforated type since it gives more uniform distribution. Some companies have found that a steel disc type spreader on the tube reduces fluxing time to about one-third or one-fourth that of plain tubes.

Another type that has been found to be very effective is that shown in Fig. 2. Although it performed well when made of iron it was eaten away rapidly by the metal and should be made of carbon or graphite. One precaution should be observed in using perforated tubes. In order to prevent metal freezing in the holes and plugging them, the fluxing gas should be turned on just before immersing the tube and kept on until the tube is withdrawn from the molten metal. Tubes used for introducing gas fluxes may pick up moisture after standing without use, particularly overnight, and it is wise to dry them before placing them in the molten metal. Degassing should be done between 1250-1350 F and then the metal raised to pouring temperature quickly.

It should also be decided whether degassing will be done in pouring ladle or melting furnace. It is preferable to degas in pouring ladle insofar as quality is concerned, since afterwards there will be only one transfer of metal. On the other hand, it consumes a great deal of

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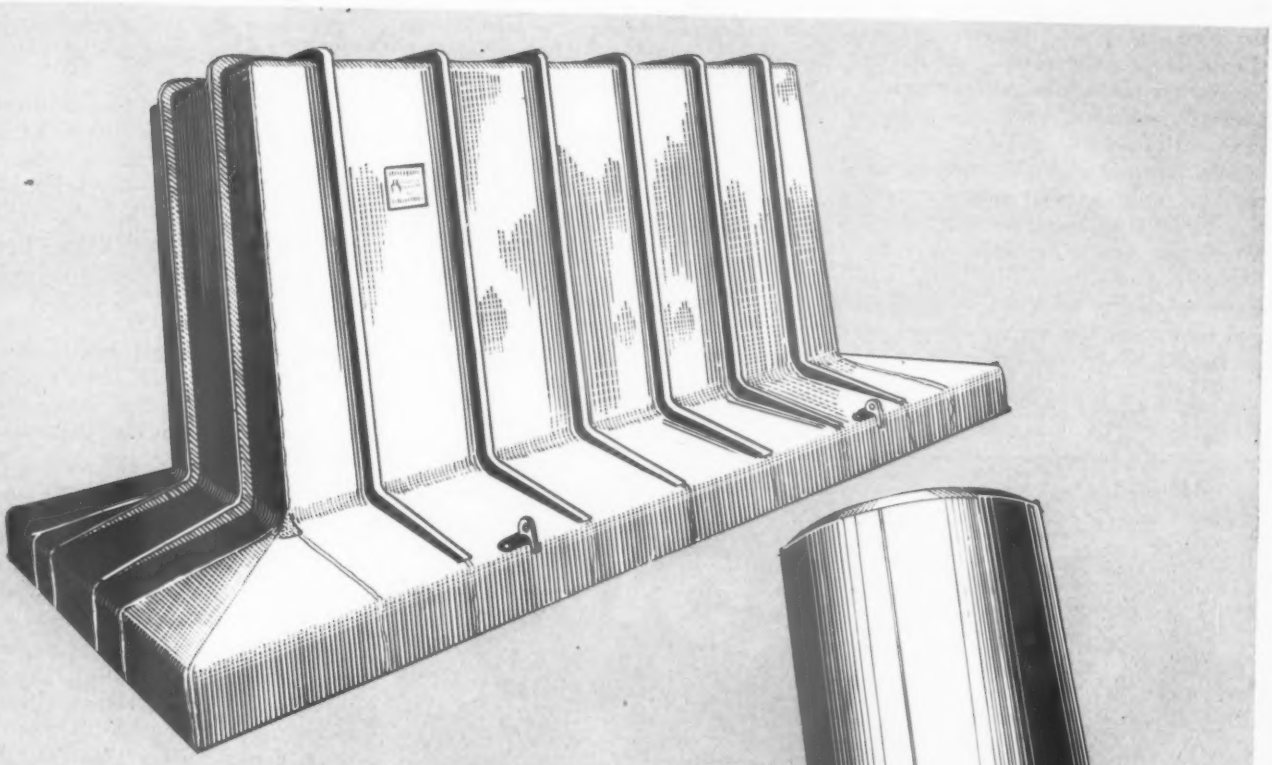

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(*Continued from page* 210)

time and metal will cool rapidly during degassing. (Any heat developed by degassing has no noticeable effect on the temperature of the metal so no allowance should be made for temperature increase from this cause.

This means either higher melting temperature, or cold metal after degassing, and in addition, equipment is tied up. Where many small jobs such as cylinder heads are to be poured, the metal may be transferred to holding pots, degassed and held under dry air, and dipped out as needed, never transferring from one ladle to another, nor pouring the heel back into the holding pot. Where bigger jobs are to be poured, or where temperature is a problem, the metal should be degassed in the melting furnace.

Degassing under dry air is even more effective than regular degassing. For example, a 5 per cent copper alloy (195) was melted and degassed with chlorine in the regular manner, and metal from the same heat was melted and degassed with chlorine under dry air. The metal degassed under dry air showed increases of 6.5 per cent in tensile and 23 per cent in elongation. In fact, many aluminum foundries have found it necessary to melt and degas metal under dry air blanket. Sometimes they have gone so far as to air-condition the entire melting and pouring area.

If it is necessary to hold degassed metal for any length of time after degassing, it should be covered with a dry salt flux and the temperature dropped to 1200-1300 F. After about 1½ hours of holding in this manner the metal should be pigged and remelted. Although re-degassing is sometimes used instead of pigging the metal, this may result in grain coarsening.

Since both nitrogen and chlorine remove foreign material and purify the metal it is to be expected that the number of nuclei around which crystallization can start will be smaller, and grain size will therefore be larger.

Nitrogen has one advantage in being nontoxic and noncorrosive. It is not difficult to handle, and equipment maintenance is low. It is established that about 1 cu ft of nitrogen is required for each 100 lb of aluminum. The flow rate and gas pressure are variable, increasing with the depth of molten metal and size of melt. In fluxing 800 lb melts 24-in. deep, a nitrogen flow of 24 cu ft per hour at 2 psi was found successful. This should require about 20 minutes.

Nitrogen Fairly Satisfactory

In numerous experiments performed by the author, nitrogen did not remove gas present in the metal if the products of oil combustion had been in contact with the metal, or if calcium was present in the metal. In brief, nitrogen was found to be a good general purpose degassing agent, much better than dry salt fluxes, but not as satisfactory as chlorine under very severe or unusual conditions of gas porosity.

Chlorine is toxic and corrosive on equipment, thus making equipment maintenance a problem. Special gages and fixtures are needed. On the other hand, chlorine possesses very definite advantages as a degassing agent.

The author found that about 15 minutes degassing with chlorine for a 1000 lb melt uses about 1½ lb of chlorine. For 100 lb heats 2 to 5 minutes are required.

Chlorine was found to be a more effective degassing agent than nitrogen in the overall picture, particularly where severe or exceptional gas pickup occurs. For example, even with 660 grains of moisture per cubic foot of air, metal free of visible pinhole porosity could be produced by chlorine degassing.

Nitrogen had no effect in reducing pinhole of metal melted with products of oil combustion in contact with the metal, but chlorine reduced the size of

(*Concluded on page* 214)

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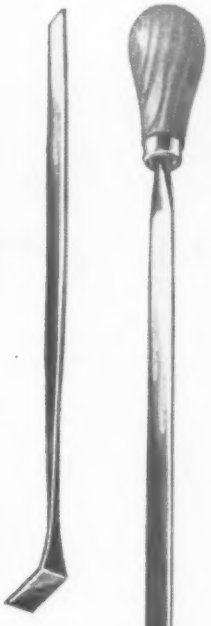

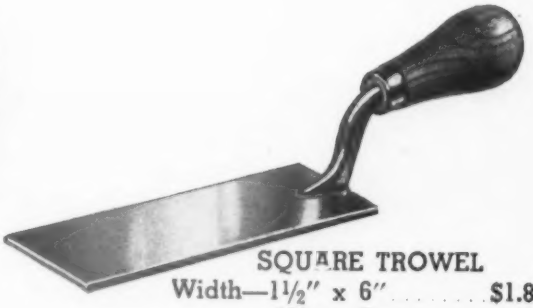

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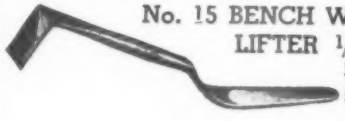

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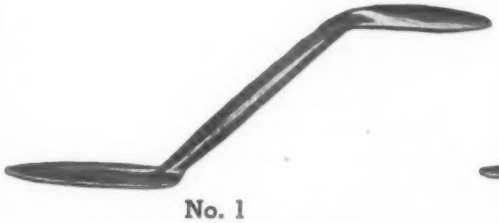

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(*Concluded from page* 212)

the pinholes and decreased the number of such pinholes as much as 20 per cent.

Nitrogen would not remove the severe gas porosity resulting when calcium above .02 per cent was present in A132 (Lo-ex alloy) but chlorine would not only reduce the calcium content but it would also eliminate the porosity. However, to obtain these results chlorine had to be bubbled into the melt about twice as long as required by normal procedure.

In order to refine the grain and degas at the same time, chlorides of boron, titanium or vanadium are used. Carbon tetrachloride is effective as a degasser but does not give the grain refinement imparted by boron, titanium or vanadium chlorides, and is less effective volume for volume.

Chlorine acts differently on different alloys. In some it tends to reduce the freezing range, probably due to improvement in purity. Degassed alloys appear to have much greater shrinkage than those not degassed, because they contain less of the dissolved gas which is normally liberated on solidification and which reduces the gross amount of shrinkage. Properly degassed metal may therefore require more feeding than gassed metal.

When used to degas aluminum-silicon alloys that are below eutectic composition (11.5 per cent silicon) some modification occurs, and when the alloy is above the eutectic composition some coarsening occurs. When used in aluminum-silicon alloys which have been modified with sodium, chlorine tends to demodify them. If excess chlorine is used, coarsening of the grain occurs. On the other hand, if chlorine precedes the modifying process, the resulting metal is gassy. Probably the best solution is to degas the unmodified alloy with chlorine, modify with sodium, and finally degas briefly with nitrogen.

In addition to forming pinhole porosity, gas can also contribute to microporosity. This type of porosity more nearly resembles shrinkage porosity in that it seems to occur along dendritic boundaries and does not have the sharp round or angular structure of pinhole porosity. Microporosity results in areas having a spongy texture of more or less interconnected voids.

In solid solution types of alloys, gas tends to accentuate microporosity rather than form pinhole, unless it is present in large amount. Microporosity may not be visible on machined surfaces but can be seen by x-ray or under the microscope.

Summary—Gas porosity results from the liberation of hydrogen from metal as it solidifies, and usually occurs in the form of pinholes.

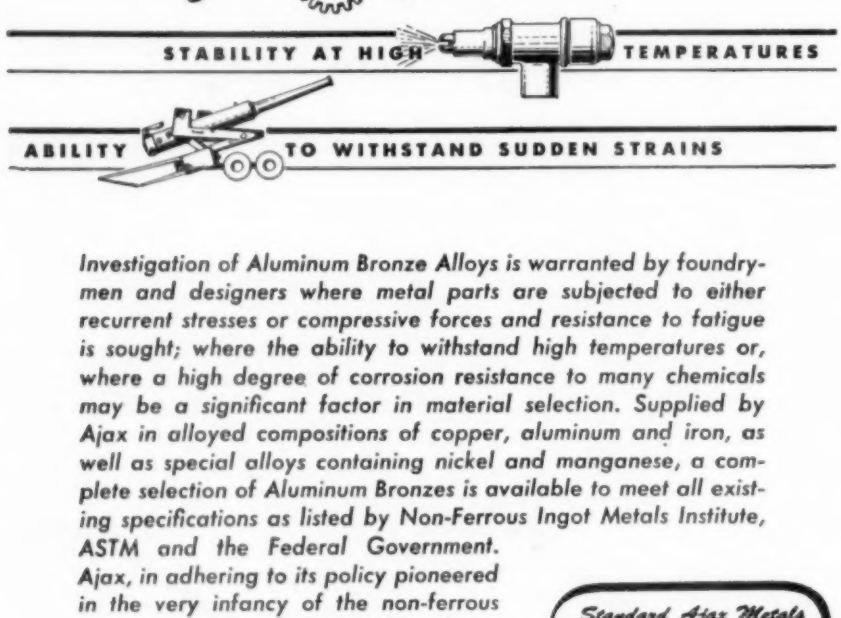
Hydrogen can be picked up from improper melting, oily scrap, metal exposed to weather, high atmospheric humidity, improper pouring or metal transfer, chemical composition of the metals or very low sand permeability.

Dry salt fluxes may help prevent gassing if used as a cover during melting, but for thorough degassing gaseous fluxes such as nitrogen and chlorine are used.

Chlorine fluxes are better degassing agents than nitrogen, particularly where excessive or unusual porosity is present.

Name AFA Lecture Course Committee

H. M. St. John, superintendent, Crane Co., Chicago, has been named chairman of the 1947 annual lecture course committee of the American Foundrymen's Association. Other committeemen are: H. Bornstein, director of testing and research laboratories, Deere & Co., Moline, Ill.; Duncan P. Forbes, president, Gunite Foundries Inc., Rockford, Ill.; Gosta Vennerholm, metallurgist, Ford Motor Co., Dearborn, Mich., and N. E. Woldman, Norman E. Woldman Inc., Upper Montclair, N. J.



Investigation of Aluminum Bronze Alloys is warranted by foundrymen and designers where metal parts are subjected to either recurrent stresses or compressive forces and resistance to fatigue is sought; where the ability to withstand high temperatures or, where a high degree of corrosion resistance to many chemicals may be a significant factor in material selection. Supplied by Ajax in alloyed compositions of copper, aluminum and iron, as well as special alloys containing nickel and manganese, a complete selection of Aluminum Bronzes is available to meet all existing specifications as listed by Non-Ferrous Ingot Metals Institute, ASTM and the Federal Government.

Ajax, in adhering to its policy pioneered in the very infancy of the non-ferrous metal industry, exercises the closest scientific control over the production of these alloys. Metal men may look to Ajax with continued confidence not only for supply of highest quality Aluminum Alloy ingots, but also for practical technical know-how on correct foundry practice for producing better castings with fewer rejects. Request booklet "Ingot Metals of Today".

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Ajax Golden Glow Yellow Brass
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Ajax Manganese Copper
Ajax Aluminum Alloys
Ajax Phosphor Copper
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GOOD MANAGEMENT IN PATTERN SHOP

(*Continued from page* 71)

neering department. Co-operation is one of the easiest ways of cutting costs, not only in the pattern shop but also in the foundry and machine shops. To avoid oversight of any important point this committee should work from a mimeographed check list of design features affecting costs.

The engineering department should be organized to prepare detail drawings of core prints, parting lines, location of pattern in flask, and other necessary details. Dimensions, tolerances, and whether the shrinkage allowance is to be 1/16, 1/10 or ⅛ in. per foot should be approved by the committee and not left to the imagination of the pattern shop foreman who may be tempted to increase tolerances for machining to help out a poorly operated foundry. Whether the pattern is to be permanent, substantial or temporary should be specified since the quality of required workmanship is affected. Color standards specified by the American Foundrymen's Association should be followed.

Reproduction equipment is available for altering quickly the dimensions of a machine shop drawing for use in the pattern shop.

Strive for Solid Construction

In reviewing the pattern drawings the committee should strive for solid construction, reasonable draft, ample core prints, proper marking of patterns and proper clearances of cores. Gating and risering should be kept to the minimum in number and size to avoid excess melting. Patterns designed for withdrawal vertically permit machine molding. A draft of 1/64-in. per inch usually is satisfactory for that purpose. The number of loose pieces in the patterns should be held to a minimum and balanced against the use of cores. Patterns should not come apart under use. Material represents perhaps 10 per cent of the total cost of a pattern, therefore a little excess material to assure adequate strength is a small matter compared with the labor involved.

In one example a firm was unable to compete for its share (about one-third) of the market for a line of machined castings because of its use of flimsy skeleton patterns and combinations thereof that increased the weight of the casting and involved excessive machining.

Use of metal match plates should be investigated where the number of castings from a pattern exceeds about a dozen. Plates probably should be used in any case where the number of castings exceeds fifty. In some instances crush strips on core prints are considered better than fillets. Plenty of vents and narrow brass strips on the outline of corebox print faces will reduce the cost of maintenance. Molding machine frames and flask sizes should be standardized. In extension of the preceding, reference may be made to 21 suggestions for getting low-cost sand castings outlined in Herbert Chase's *Handbook on Designing for Quantity Production*.

Patterns should not be stored in odds and ends of space as may be available in a manufacturing plant. A separate building or one or more floors in an existing building should be set aside for pattern storage. A building designed for storage is even more desirable. Sometimes it is economically possible to reduce the number of stored patterns by getting rid of obsolete items. The building should be fireproof and equipped with sprinklers. It should have concrete, brick or stone walls; steel frame; and a tile, concrete slab, or slate roof. The south wall should have no windows and the east and west walls should have windows with special glass, which eliminates much of the sun's heat. This is

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preferable to frosted glass. As much daylight as possible should be brought in through windows in the north wall. Direct rays of the sun should be kept off the patterns. Painted lines on the floors should indicate aisles that should be broad enough for the passage of lift trucks. An elevator should be provided, or ramps installed from floor to floor to facilitate movement of lift trucks.

Ordinary changes in temperature or humidity on the outside of the pattern storage building will not materially affect the patterns. Artificial heat is desirable in some localities in sufficient amount to take the edge off the worst conditions of cold and humidity.

Over a period of years even the small pattern shop accumulates a large number of patterns. Proper storage and control by index cards is important. Each index card should show, by appropriate columnar notations, where a pattern is stored by name of building, floor number, rack, section and shelf. Other items listed on the card include drawing numbers applicable, pattern number, pattern material, corebox material, shrinkage allowance and the number of loose pieces in the pattern and in the corebox. Additional space also should be provided for the date each time a pattern is removed from storage, where it is sent, and the date it is returned. Lack of records on the use of patterns is the greatest handicap to management in determining what patterns should be kept.

Embossed zinc tapes or equivalent showing their serial numbers should be attached to patterns and coreboxes. The cheapest way of putting numbers on the tape is with steel dies and hammer, except for the larger pattern shop where an expensive embossing press can be justified.

Practices followed by many manufacturers in the storage, charges for storage, and determination of obsolescence of old patterns have been debated at meetings and described in papers in technical publications. Patterns should be subjected to periodic review by a committee of at least four men representing the foundry, pattern shop, engineering, and sales departments. An attempt to make the storage of patterns as lucrative as possible is worth the effect of any management. Many manufacturing companies fail to recognize the costs involved in unnecessary storage of obsolete patterns and their free storage for customers.

Notify Various Departments

When patterns are scrapped, the cost and accounting departments should be notified so that any charges remaining on the books for those patterns may be written off. The engineering and production departments also should be notified for purpose of correcting pattern records and drawings. It is desirable to have an inexpensive, mimeographed standard form for this notification. The master record of patterns and their use should be kept in the pattern shop, but the engineering and production departments should have a list of patterns available and the corresponding drawing numbers.

Patterns and coreboxes frequently used should not be returned to storage until dirt has been brushed off or blown out and they have been wiped to remove all traces of sand and oil. Necessary repairs should then be made and the patterns repainted if necessary. Infrequently used patterns may be returned to storage after cleaning with the expectation of making repairs and of painting before the next use.

Keep the pattern shop clean. Odds and ends of lumber and old patterns should not be allowed to accumulate under work benches. Patterns should not be stored in the pattern shop. A neat shop is often an indication of low-cost operation. White paint lines on the floor should be used to show aisles wide enough for the passage of lift trucks. Encroachment upon aisles

(*Continued on page 218*)

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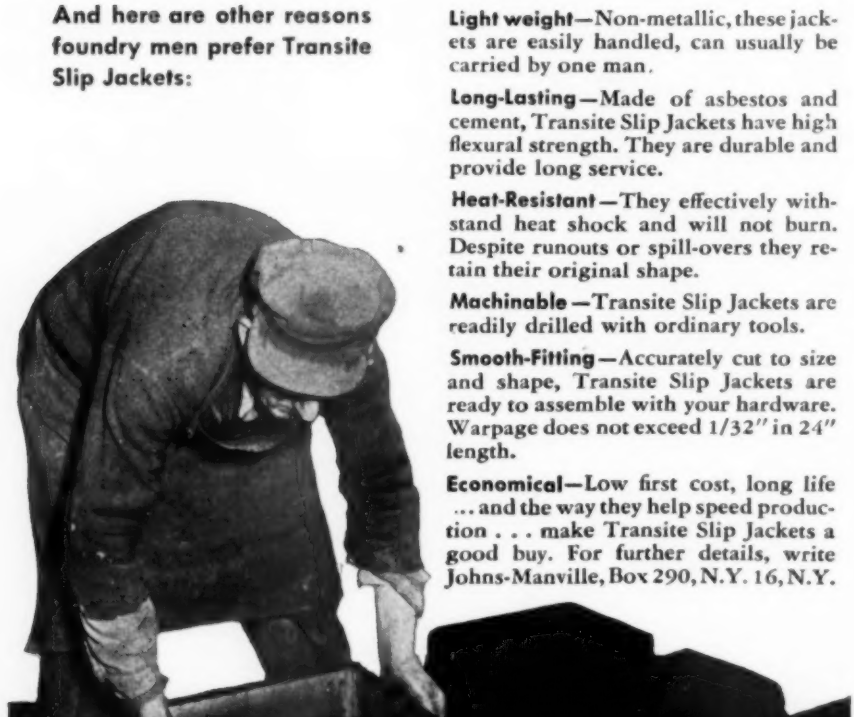

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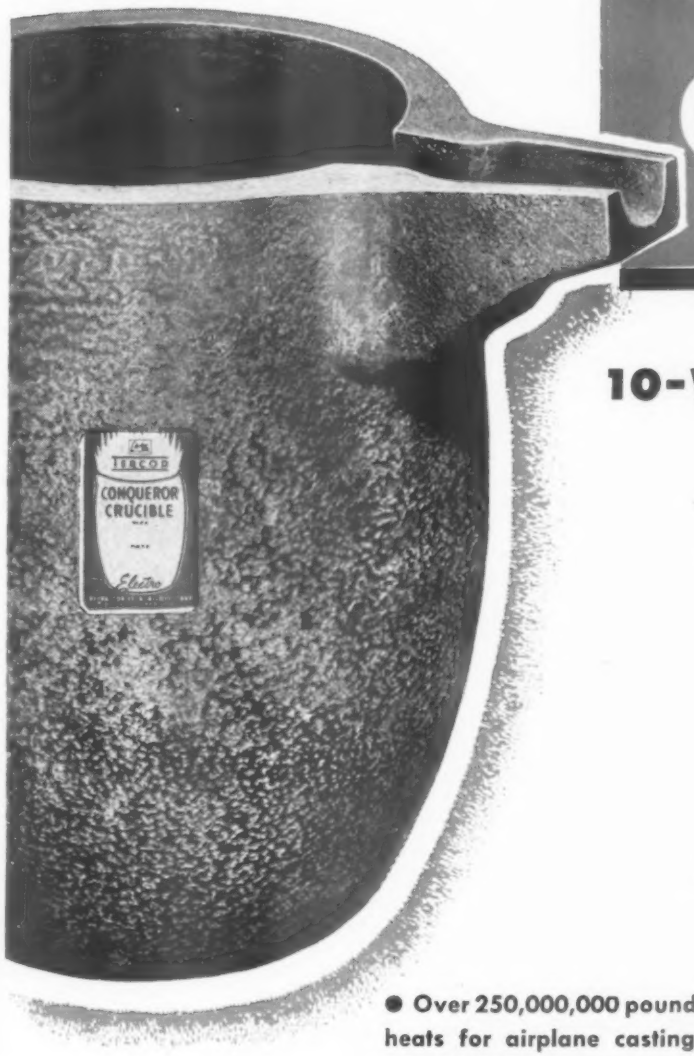

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(*Continued from page* 216)

by workmen and patterns should not be permitted.

Fire insurance rate as low as about 6 cents yearly per $100 is possible for the pattern shop and pattern storage properly designed structurally and equipped with sprinkler protection. Any shop enjoying such a low rate has an advantage in a business depression as the fixed charges it has to meet to stay in business have been reduced. With low rates it is possible to carry ample insurance for other dangers, loss of occupancy, riot and civil commotion and other protection that the successful business has as a matter of course.

A low accident rate is characteristic of the well run pattern shop. A measure of what is possible in woodworking is the three-year average frequency rate of about 25 for lost-time injuries per million man-hours. The severity rate in woodworking in days lost per thousand man-hours of exposure has a three-year average of about 1.1. Some pattern shops are doing better, of course, than the preceding average rates for woodworking shops. One woodworking shop has a record of about 2,300,000 man-hours that were injury free. Low accident rates are reflected directly in the charges of the insurance company for compensation insurance.

Use Safety Guards

Safety guards should be in place on all machinery when in use, including the grinding wheel which should have a safety shield. Oily rags should not be permitted to lie on the floor. J. Robert Hall in his *Practical Wood Patternmaking* has outlined numerous protective methods in the use of hand tools that should be observed by the skilled patternmaker.

The small pattern shop often is supervised by a foreman whose knowledge of patternmaking has been gained through practical experience unassisted by any formal technical training. He might well be given at company expense a short course in patternmaking at one of the trade schools or state universities. He will then be better able to train his patternmakers in efficient methods. The employer in any case should spend at least $50 on the installation in the pattern shop of a small library of selected books on patternmaking. Their use could be fostered by modest prizes for evidence of intelligent reading. Subscriptions to two or three magazines devoted to the foundry and to woodworking should be included in the library service to pattern shop employees.

A working foreman should be used in the small pattern shop. He should be required in general to check the dimensions

(*Continued on page* 220)

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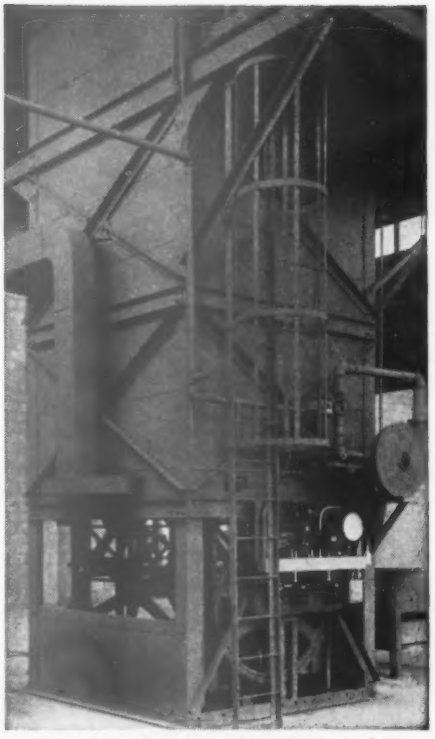

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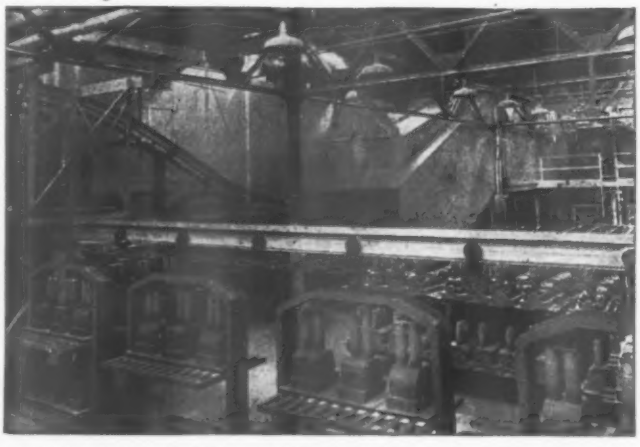

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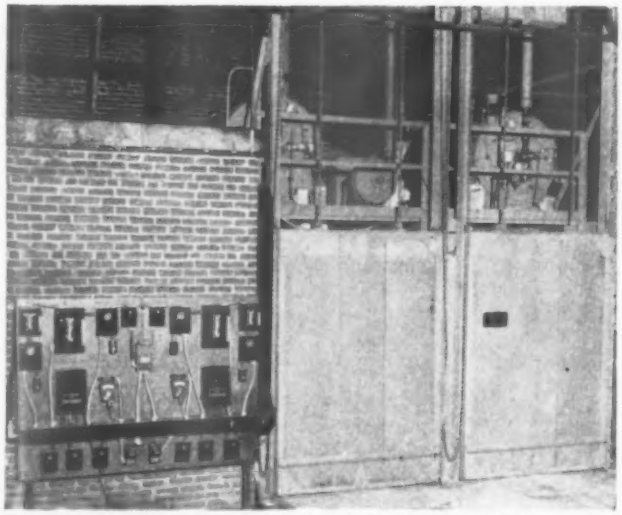

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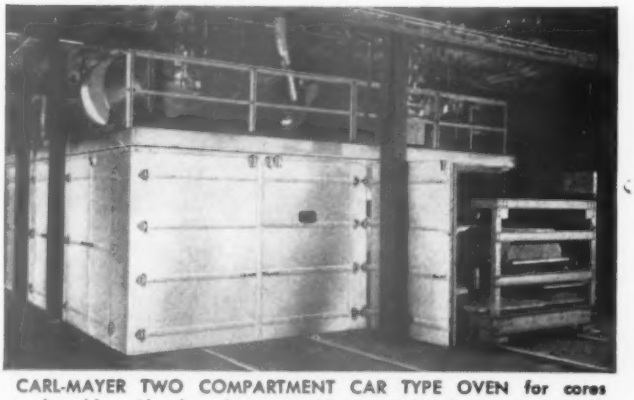

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(*Continued from page* 218)

of all patterns and coreboxes before they go to the foundry. He may need a clerk to keep pattern storage records and control blueprints if the pattern shop is very active, but otherwise he should do his own clerical work. Checking in the larger shop should be done by patternmakers.

Even the small pattern shop can afford good glue. It should be fresh every 48 hours. Thermostatically-controlled, electrically-heated glue pots should be used where the temperature is never allowed to exceed 150 to 160 F. Manufacturer's instructions should be followed on glue making, storage, drafts, temperature, use on proper wood, dilution, proper heating and similar items where care is necessary.

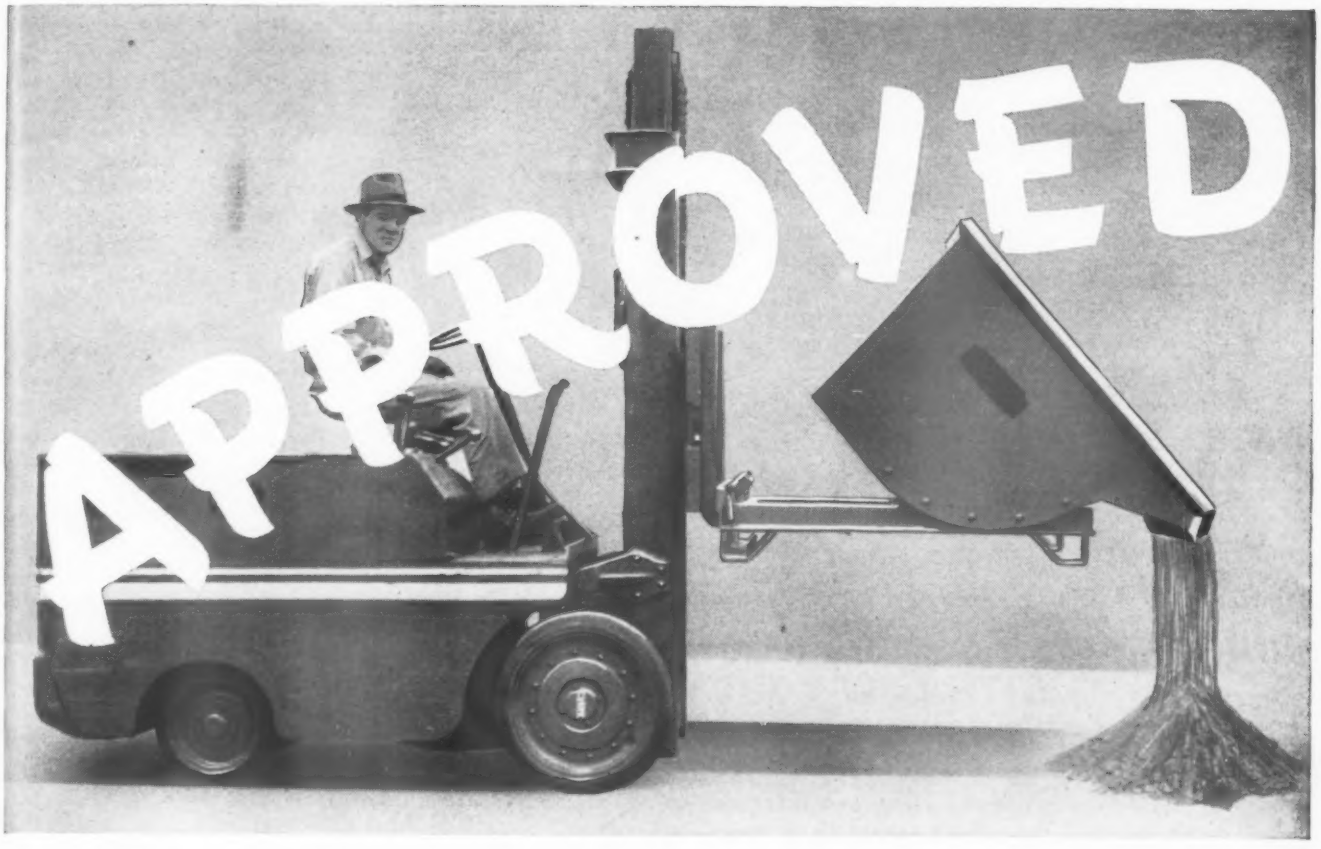
An investigation by the American Foundrymen's Association has shown that the majority of patternmakers prefer shellac to lacquer. The latter costs more but is said to wear longer, to be moisture proof, and to give a smooth, hard surface that permits easy withdrawal of the pattern. Experience with lacquer, however, has not been extensive enough to justify ignoring the general preference for shellac. A pattern coating material recently developed by a prominent manufacturer of pattern shop supplies and equipment is attracting considerable attention.

Coating the Pattern

Varnish dries slowly. Shellac dries rapidly and is a good wood filler. A few patternmakers brush on shellac and lacquer or varnish, or lacquer or varnish alone. A patternmaker generally is skeptical of anything except a high-grade, light orange flake shellac. One, two, or three coats usually are given to temporary, substantial, or permanent patterns, respectively. The priming coat generally should be clear. Color, for ease in applying subsequent coats, can be added by the use of English vermillion, carbon black, or yellow ochre. English vermillion is preferred to domestic vermillion. Black extract is said by some to give a deeper, smoother tone than lamp black or carbon black.

Shellac should be purchased from a reputable dealer. It should be weighed out carefully and dissolved in genuine wood alcohol if the better and more expensive 95 per cent proof grain alcohol is not available. Wood alcohol shellac or copal varnish do not stand exposure and moisture well and are likely to become flaky and scale off. Synthetic wood alcohol and special solvents developed by paint manufacturers probably are not so good as genuine wood alcohol. Any saving on inferior shellac or solvent is small; the labor of application probably costs at least three times that of the material used.

(*Continued on page* 222)



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(*Continued from page 270*)

Less durability, particularly on substantial or permanent patterns, also is an important factor in increasing the overall, ultimate cost if inferior shellac is used.

Oxalic acid causes retarded drying, stickiness and scaling and should not be used to clear up shellac that has become dirty through exposure. Shellac should be kept in crockery containers, closed as much as possible in humid weather to prevent absorption of atmosphere moisture by alcohol.

Rubber-set brushes with rubber bindings are preferred for applying shellac. Limiting several patternmakers to one bottle of shellac and one inferior brush is false economy. It costs about 2 cents including shop overhead every time a patternmaker walks 100 ft. in the performance of his duties.

The possible use of gypsum cement patterns should not be overlooked. Pottery, rubber and aircraft manufacturers have made extensive use of gypsum cement patterns as their dimensions are not affected by climatic conditions and they are very accurate.

Production Controls — Orders for patterns may be issued by the engineering department under the general authority of previously issued production orders. A form should be used with carbons so that all necessary instructions to the pattern shop, blueprint room, purchasing agent, foundry and machine shop can be issued at one time. Instructions will vary, depending upon whether the pattern is to be made by the company's shop or by a jobber. Drawing numbers, time of delivery, shipping instructions and other pertinent data should be given.

Authorization for alterations in patterns or replacements should be issued by the production department and not left to the discretion of the pattern shop foreman. Changes in patterns should not be made unless the possible reduction in cost resulting therefrom has been investigated and approved.

Control records should be installed in the pattern shop to show the date each pattern should be started, hours required to complete, and promised delivery date. It is possible by two parallel lines of different colors to show progress of work on each pattern.

Pattern Costs—Estimated costs of pattern work are possible as a guide to the foreman of the pattern shop. Operations necessary in making most patterns can be set up by the engineering department from a study of the company's drawings. These standard operations can be shown by sketches on cards, with notes as to costs actually incurred on different jobs. Reasonable time allowances for new pat-

(*Concluded on page 224*)

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(*Concluded from page 222*)

terns can be estimated from these cards. The result will be a tabulation showing the time probably needed by the patternmaker, his helper and the checker for each pattern. The material needed can be estimated and priced easily from the drawings. Estimated costs can be used to keep pattern shop employees on their toes. Most small pattern shops have no control over costs incurred therein. The estimating outlined need not cost more than 2 per cent of the pattern shop payroll.

Pattern shop costs should be broken down among direct labor, direct material and burden. A further breakdown is desirable among new patterns, rebuilding patterns, repairing old patterns, building flasks and bottom boards, and repairing and maintaining buildings. Pattern shop costs should be kept separate from foundry and machine shop costs to insure that each production order may be charged with the cost of its patterns. Where patterns are to be used many times, they may be charged to capital investment, but their cost should be depreciated heavily each year at not less than 20 per cent.

The pattern shop should be operated as steadily as possible to avoid change in demand for personnel. For peak loads, it is desirable to order the excess patterns from jobbing shops. An additional advantage of this procedure is the check obtained on costs in the pattern shop.

A small pattern shop easily can represent an investment of $50,000 or more for equipment and building. Depreciation and maintenance may exceed $10,000 yearly. Even if there are only six patternmakers, the yearly payroll including most of the shop overhead may be about $30,000. The total yearly cost of the pattern shop therefore probably is at least $40,000. The pattern shop easily can show 25 per cent inefficiency if it is not operated well or a loss of $10,000 or more yearly, depending on size. Frequently much larger losses in machine shop and foundry are due to poor pattern shop work. Good management is justified in attempting to reduce such losses along the lines of the suggestions in this article.

Employees Honored

Three 25-year employees of Flour City Ornamental Iron Co., Minneapolis, were presented watches as a memento of their long service at the plant's Christmas Party, Dec. 24. Walter Tetzlaff, company president, made the presentation to John H. Johnson, mechanic; Edwin A. Johnson, punch press foreman and Ernest Johnson, patternmaker.

NEW HEAVY-DUTY CART

Here's just the cart you need for wheeling *coal, scrap, chips, turnings, borings* and similar heavy materials. All-steel, completely welded and reinforced. Made extra strong and rugged for heavy duty service. Dumps easily. Rests securely in any one of the three positions shown here. Available with roller bearings, if desired.

Write for Circular No. 50.

STERLING WHEELBARROW CO., Milwaukee 14, Wis.

Look for this Mark of STERLING Quality

Sterling WHEELBARROWS

PRODUCING LARGE STEEL CASTINGS

(*Continued from page 77*)

flasks laid down horizontally, as shown in Fig. 4. A sweep board with the working edge conforming to the outer contour of the proposed roll is attached to a long steel spindle, usually a length of 3 or 4-in. diameter steel pipe, mounted in journals at each end of the half flask. One end of the flask is closed and the other end is open. A temporary support for the journal is bolted across the open end.

Molds are made from a high grade silica sand, 95 to 98 per cent silica. The facing sand is bonded with clay and molasses, or other water soluble binding agent, and prepared for use in a muller type sand mixer. Sand is rammed in the flask to the approximate shape desired. The final thickness is facing sand. A straightedge is employed to scrape surplus sand from the joint face and form a plane surface flush with the two opposite longitudinal edges of the flask. The sweep then is revolved slowly by one man while a second operator roughs out the shape of the mold, by cutting down the hills and filling up the hollows under the sweep edge. On the second time around all the minor cavities are filled and smoothed over. A considerable degree of skill is necessary to pack the sand uniformly and to the required degree of density, while at the same time bringing up the face of the mold to the finished stage in what is reckoned a reasonable period of time. The second and corresponding half of the mold is prepared in the same manner as previously described.

Molds Are Dried

Both halves are dried in large ovens at temperatures that range from 700 to 800 F for periods from 12 to 36 hours depending on the size of the mold and the volume of sand. At different times, rolls varying to a considerable extent in diameter may be molded in the same flask. Obviously, the volume of sand around a small roll is greater than the amount of sand in a flask where the roll cavity takes up nearly all the space.

After the half molds are dried, the corresponding halves are assembled horizontally on the floor and clamped or bolted together. Each completed flask then is upended and lowered into a deep pit for convenience in pouring the metal from the nozzle in the bottom of a large ladle.

A long vertical sprue incorporated in one half of the mold extends from top to bottom. Metal enters the mold

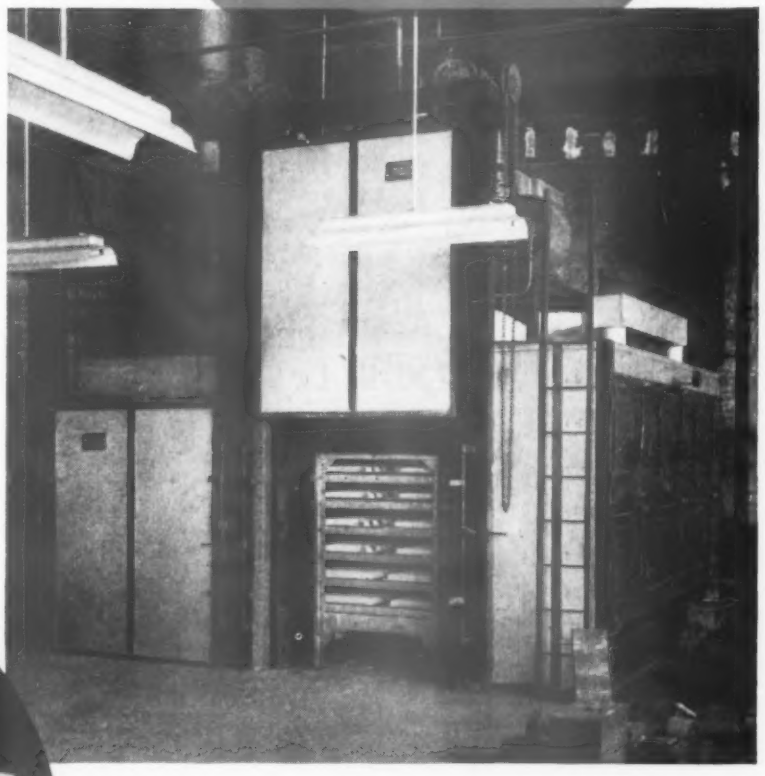
(*Concluded on page 226*)

Modernize with MAEHLER

. . . for higher production and better baked cores—modernize your core baking facilities with Maehler-engineered equipment.

You can turn out better cores, faster and at less cost with Maehler-engineered ovens. One reason for this is the recirculating air heat principle which is incorporated in Maehler ovens. This principle, pioneered and perfected by Maehler, assures perfect heat uniformity, shortens baking time, gives you more perfectly baked cores and eliminates green or burned cores.

Maehler core and mold ovens are available in a complete range of oil-fired, gas-fired and electrically heated units. Plan now to modernize your core-baking facilities. Call a Maehler engineer today or write for latest bulletins.



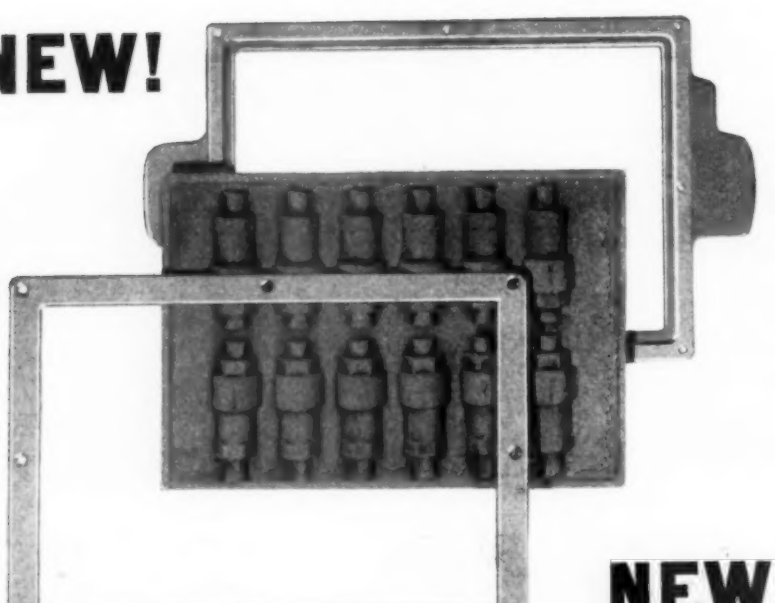
The photos reproduced here, taken at the American Brake Shoe and Foundry Co., show a Maehler oil-fired, four-rack, double compartment lift door oven which was installed to replace obsolete coke-fired ovens. The view at the left shows the six double door side compartments in this oven for small cores. With this modern Maehler installation the user reported more uniformly baked cores, one bake every 2½ hours instead of one per day, elimination of smoke in the core room and low cost efficient operation.

THE PAUL MAEHLER COMPANY
2200 WEST LAKE STREET CHICAGO 22, ILLINOIS

MAEHLER

Industrial Ovens and Furnaces for Core Baking, Mold Drying, Heat Treating, Enameling, etc.

NEW!



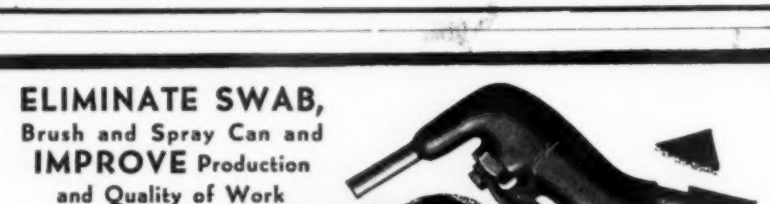
NEW!

TAMMS DEMOUNTABLE FRAMES

* New type demountable frame that is much stronger than a cast aluminum frame. It is made of laminated sheet aluminum (frame thickness ⅞"). It eliminates the necessity of a separate frame for every job. When production run is completed Super Tamastone Plate is easily and quickly removed and frame is available for another job. Write for details and prices today!

TAMMS SILICA CO., 228 N. La Salle St., Chicago 1, Ill.

ELIMINATE SWAB, Brush and Spray Can and IMPROVE Production and Quality of Work



BLACKEN MOLDS

with the

MURPHY PISTOL SPRAYER

Blackening reaches hidden pockets as well as all accessible surfaces and is driven into the pores of the sand by air pressure. Molds are blackened faster! Castings peel better! Work comes cleaner!

SATISFACTORY PERFORMANCE GUARANTEED OR MONEY REFUNDED

Trigger control means effortless handling and economy of air consumption. Used for Silica wash, oil, water or any liquid material. Used for sand blast cleaning of permanent molds and castings. Without suction hose the Murphy Pistol Sprayer becomes a perfect blow gun, used to advantage for the cleaning of motors and machinery.

Prices, complete with Suction Hose and Sinker

Pipe Size	Price FOB Hamilton, O.
1/16"	$10.00
1/8"	10.00
1/4"	10.00
3/8"	12.00
1/2"	15.00

(There has been no increase in these prices since 1910).

If your dealer cannot supply you, order direct . . . literature on request. Address Dept. A-11.

GUARANTEED COMPRESSED AIR PRODUCTS

AFTERCOOLERS • SEPARATORS • STRAINERS • TRAPS
SPRAY GUNS • PISTOL SPRAYERS

JAS. A. MURPHY & CO.
HAMILTON, OHIO, U.S.A.

Moisture Elimination Up To 3000 Pounds Per Square Inch

(*Concluded from page 224*)

through a gate set at a tangent to the lower neck a short distance above the wabbler. The pattern forms the wabbler at the lower end, but the upper neck is carried full size past the position of the wabbler and then enlarged for an additional height to serve as a sinkhead. The wabbler is cut in the machine shop after the sinkhead has been removed.

Roll castings remain in the molds for 36 to 72 hours after they are cast. Then they are lifted out of the pits, shaken out, cleaned, annealed in large furnaces provided with removable top bungs, and later transferred to another location where the heads are cut off in special type, heavy duty lathes.

Steel rolls are annealed twice, first at 1750 F to break up the dendrites, and second at 1450 to 1550 F, depending on the composition. Usually both anneals are followed by slow cooling, although in some instances the cooling rate after the first anneal may be quite rapid. Holding time at the 1750 F anneal usually is about 1 hour per inch in diameter of the roll body, followed by 1½ to 2 hours per inch for the anneal at the lower temperature.

Heats are worked so that the initial carbon content is sufficiently high to allow for at least a 2-hour refining period. The necessary amount of silicon and manganese are placed in the furnace when the carbon content reaches the desired point. The furnace is tapped 20 minutes afterward. Temperatures, tapping and pouring on all heats are checked by optical pyrometer and form part of the log or record that is kept on all heats and on all castings.

Eye Safety Guide Is Offered

A new eye safety guide which lists industrial eye hazards by industries and recommends the proper protection equipment has been published by American Optical Co., Southbridge, Mass.

Seventeen eye-hazardous operations in 17 industries are listed in the guide which also contains descriptions and pictures of the equipment that should be worn for complete eye protection. The guide is so arranged that the proper choice can be made in a few seconds.

Founders Directory

Gray Iron Founders' Society Inc., 1010 Public Square Bldg., Cleveland 13, on Dec. 1, 1946 published its new "Directory of Members." Contents of the new directory are divided into three sections: Officers, directors and executive staff; members by firm name, and members by states and cities.

AJAX LO-VEYORS

AJAX LO-VEYORS CUT FOUNDRY COSTS

Ajax Lo-Veyors are ideal for use in foundries because their fully enclosed reciprocating drive unit and elimination of conveying belts, chains, rollers and pulleys make them operate satisfactorily regardless of abrasive conditions.

The vibrating pan or tube floats on rubber mounted springs, eliminating bearing wear. The entire conveyor is self-contained, delivered ready to run. It requires little head room (averaging less than 18"), can be set on the floor, in a pit, on wall brackets or suspended from ceiling.

They can be made in various lengths and will move sand and small castings. They provide large capacity with low power requirements.

Repeat orders based on 10 years' experience are proof of their low first cost, lower operating cost, lowest maintenance cost.

Ohio Foundry Moves 40 Tons of Spill Sand Per Hour

The above sketch shows an Ajax Lo-Veyor which is cutting foundry costs by conveying spill sand a distance of 14 feet into a temporary storage pit. Keeps floor clean and saves a lot of shoveling.

This installation is typical of their many uses in foundries . . . for short and long hauls . . . outdoors or indoors.

Write for data.

Ajax Flexible Coupling Co. Inc.
Conveyor and Screen Division
Westfield, N. Y.

New Equipment and Supplies

(1)—Respirator: Scott Aviation Corp., Safety Equipment Division, Lancaster, N. Y.—New type industrial respirator provides the advantage of "demand" respiration for use in dusty, objectionable or harmful atmospheres. "Demand" respirator uses only one-half the volume of air required by "constant flow" respirators and eliminates the steady and irritating flow of air over the wearer's face. Inhalation is natural and effortless. The new respirator can be used with a choice of many types of face masks.

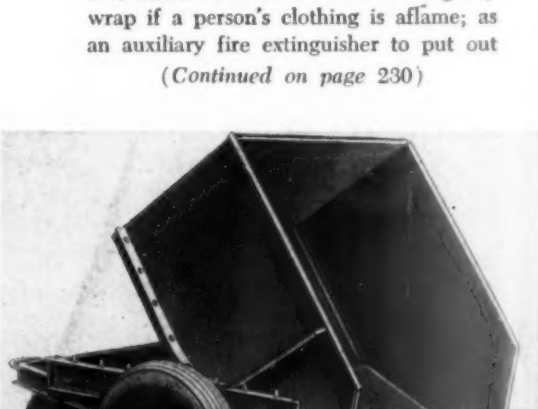
(2)—Goggle: American Optical Co., Southbridge, Mass.—New acid-resisting synthetic rubber, closely fitting face-form goggle is equipped with a single, wide-angle vision, easily replaced acetate lens. Designed to protect workers against chemical and dust hazards the goggle can be worn in combination with the company's R-1000 respirator. It is well ventilated and may be worn directly over the eyes or over most types of prescription glasses. It is recommended for wear on jobs requiring handling of acids and caustics; it protects against chemical splashes, spray and impact of foreign particles and exposure to fine dust concentrations.

(3)—Grinders: Rotor Tool Co., 17325 Euclid Ave., Cleveland—Two new air grinders, the D-325 for 8 in. wheels (shown here), and the D-125 for 6 in. wheels, are suitable for cleaning, grinding or snagging castings of all kinds, hogging out defects in large steel castings for welding and later for grinding the welds and other grinding operations. In operation a governor idles the machine at the permissible free speed, as determined by the safety code, and as soon as pressure is applied to the work, it opens quickly and positively to deliver full air at high load speed. The D-325 is available with straight handle or spade handle (as shown) or safety handle, at speeds of 4500 rpm for 8 x 1 elastic wheels, 4100 for 6 x 1 vitreous wheels and 3100 for 8 x 1 vitreous. The D-125 is available in speeds of 6000 for 6 in. elastic wheels, 4100 for 6 in. vitreous and may be used at 6000 for 4 in. vitreous. Weight of the D-325 is 11¼ lb and D-125, 9¾ lb.

(4)—Trailer Truck: Phillips Mine & Mill Supply Co., 2227 Jane St., Pittsburgh—Trailer dump-truck is equipped with pneumatic tires and an optional center caster for greater maneuverability, ease in handling, faster haulage and dumping of scrap, castings, sand and other materials. Its construction includes the roll-over type body, chain release and quick return to normal position. Of welded steel construction throughout and equipped with Timken bearings, the truck is of 1 cu yd capacity.

Fire Blanket: United States Rubber Co., Rockefeller Center, New York—Fire blanket can be used as an emergency wrap if a person's clothing is aflame; as an auxiliary fire extinguisher to put out

(*Continued on page* 230)



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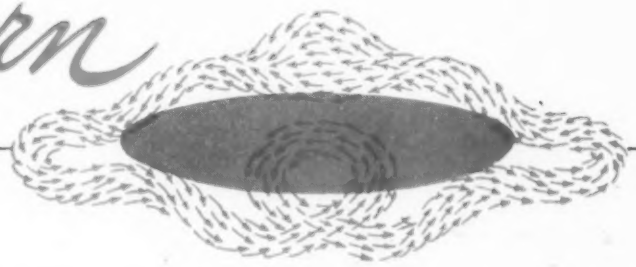


For COMPLETE SAND PREPARATION

IN THE

CLEARFIELD MIXER

Arrows show course of sand in Clearfield revolving bottom mixer.

This pattern of sand flow in the Clearfield Mixer illustrates its superiority in sand preparation.

THE revolving pan throws the sand to the side wall where it is deflected and thrown back, keeping it in violent motion during the entire mixing period. This constant motion eliminates any inaction and gives balanced mixing and tempering in a minimum of time.

Write for complete information about the Clearfield for fast, complete sand preparation.

CLEARFIELD MIXER

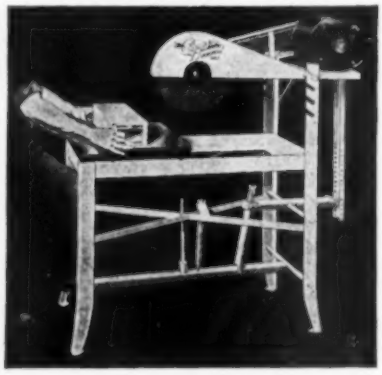
MIXES, TEMPERS AERATES

CLEARFIELD MACHINE COMPANY

CLEARFIELD PENNSYLVANIA, U. S. A.

FASTER CUTTING ...with Clipper Masonry Saws

Your Special Size and Shape Brick or Concrete Block can now be "Tailor-Made" at a moment's notice!

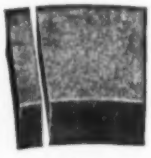


The new Clipper Multiple Cutting Principle makes possible faster cutting of every masonry material regardless of hardness.

Here are a few typical examples of the speed and accuracy with which concrete products and fire brick can be cut.

This concrete block, converted into a special size, was cut completely in two in 19 seconds.

One of the many intricate cuts performed on first quality clay brick for heat treating furnaces —made in 8 sec.



Rotary Kiln Blocks, cut to size for "key" bricks in rotary kilns, require only 10 sec. for completion of cut.

Basic refractories for steel furnaces or cement kilns must be accurately installed. This magnesite brick was cut in 12 seconds!

CLIPPER MFG. COMPANY
2800 Warwick, Kansas City 8, Mo.

(*Continued from page 228*)

flames from vents, manholes, small containers or tanks; as a fire shield; as a welding screen and as a salvage blanket to protect valuable materials from water, chemicals and heat. Made of high tensile strength glass cloth, it is impregnated on both sides with synthetic rubber and is 60 x 80 in. in size. It is equipped with large brass grommets so it can be hung up and easily removed or replaced. It is colored red and marked with the words, "Fire Blanket."

Hoist: Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.—Roller-chain electric hoists of ¼, ½ and 1-ton capacities weigh only 87 lb. Hoists are equipped with simple, double-reduction, totally enclosed, worm-gear drive; all-steel hoist frame; self-energizing motor brake, which does not require adjustment; and upper

and lower safety limit switches. Load hook has a universal action and swivels on ball bearings, which prevents the roller chain from twisting. Hoist can be controlled with one hand by means of a single bar grip. Where the overhead suspension point is high the hoist can be operated in an inverted position by suspending it by the hook on the chain and attaching the load to the hoist.

Fire Extinguisher: American-La France-Foamite Corp., Elmira, N. Y. —New midget fire extinguisher has total weight of less than 12 lb with contents weighing only 3 5/8 lb but which expand upon release to 450 times their contained volume. Extinguisher contains carbon dioxide gas which is nonpoisonous, noncorrosive, odorless, a nonconductor of electricity, will not freeze at any climatic temperature, is heavier than air and will not support combustion. Extinguisher is suitable for putting out small fires in oils and greases, and in small electrical hazards.

Table: Leo G. Brown Engineering Co., 1127 Riverside Dr., Los Angeles 31 —Small heavy-duty two-way sliding table is precision built with an accurately gaged

travel of 5 in. in each direction, and is designed for quick mounting to any drill press. Table's versatility is said to save many man-hours of setup time on small production work in metalworking and woodworking. Table top is 7½ in. square, 3¾ in. high overall, weighs only 24 lb and is fitted for 1 in. T-bolt heads.

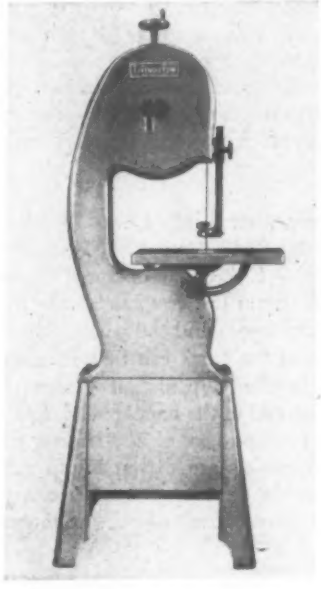
Tractor: Clark Tructractor, division of Clark Equipment Co., Battle Creek, Mich.—Known as Clarkat, this improved towing tractor has a wider steering axle, either pneumatic or solid tires front and rear, forged steel spindles, center pivoted suspension of steering axle and center control type steering gear operating through worm and gear sector, greater accessibility to motor and drive units, standard automotive type transmission with three speeds forward and one reverse, water pump in cooling sys-

tem, mechanical governor for closer control of speeds and better carburetion, and a flattened nose to provide surface for pushing loads.

Caster: Rapids-Standard Co. Inc., Dept. CA-41, 308 Peoples National Bank Bldg., Grand Rapids 2, Mich.—New formed steel caster is suitable for use on all types of light trucks, dollies and other portable equipment. Its top plate, measur-

ing 2½ x 3⅝ in., is formed from ⅛-in. steel. Overall height is 4 11/16 in. Double ball race assembly provides free-swiveling action under rated load capacities. Freedom from dirt interference and much longer swiveling life are assured by a deep drawn upper raceway swivel bearing cup design which covers and protects the ball race. Caster is available in swivel and rigid models, equipped with hard or soft tread molded rubber 3½ in. wheels, and has a capacity load rating of 125 to 250 lb.

Band Saw: Livingston Mfg. Co., South Gate Calif.—Heavy duty band saw will cut wood, plastics and metals. Vertical cutting clearance is 10 in., horizontal clearance is 13¾ in. Cast iron tilt table is precision ground to .005-in. and measures

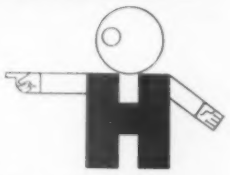


17 x 20 in. Frame and guard are a one-piece casting finished in battleship gray. Wheels are balanced, double row, ball-bearing mounted with a one-piece precision ground rubber tire. With the optional 24-in. cast iron base, which holds the mount for the motor (½ or ¾ hp), the entire machine is 75 in. high.

Hydraulic Pump: Aldrich Pump Co., Allentown, Pa.—Simplex, double acting hydraulic pump, powered by air, is designed to provide low volume, high pressure service economically and efficiently. Initial and operating costs are said to be exceptionally low and troubles with "wire pulling" through relief valves, as well as the need for constant adjustment, are eliminated. On hydraulic demand, pump starts to operate and continues until total pressures in air and hydraulic sides equalize. By specifying proper ratio of air piston to hydraulic

HOFFMAN VACUUM CLEANING

WILL GIVE YOUR FOUNDRY BETTER WORKING CONDITIONS GREATER PRODUCTION



Hoffman Heavy Duty Industrial Vacuum Cleaning Systems will improve working conditions and safeguard health and when used on production operations, will save you time and costs. Let us tell you about many uses in the foundry where Hoffman Vacuum Equipment will save you money.

HOFFMAN SPECIALIZES IN VACUUM CLEANING SYSTEMS FOR INDUSTRY
SEND FOR LITERATURE

MOULD CLEANING by vacuum eliminates costly compressed air; overcomes objectionable blowing of sand and dust.

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AIR APPLIANCE DIVISION, 111 FOURTH AVE., NEW YORK

METAL CLEANING

the book that tells how to do it better

IMPACT CLEANING . . . . . .

by: W. A. Rosenberger

■ This 480 page book contains full information on the latest and most approved methods of impact cleaning, including blast-cleaning and sandblasting. It tells the reader of approved methods of cleaning under all conditions and for all types of products.

A practical book telling how to reduce cleaning expenses by application of proved methods.

In three parts: Part one covers Nozzle Blast Cleaning Equipment; Part Two, Mechanical Impact Cleaning; Part Three, Ventilation of Impact Cleaning Equipment . . . all profusely illustrated and cross-indexed for easy reference. "Impact Cleaning", $7* postpaid.

*Orders for delivery in Ohio must be accompanied by an additional 3% to cover compulsory state sales tax.

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MAKING BETTER CASTINGS FOR 64 YEARS

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Core Pastes and Binders
Shake Bag Facings
Anti-piping Compounds
"Ferrograph" Graphitizer
Special Facings & Compound

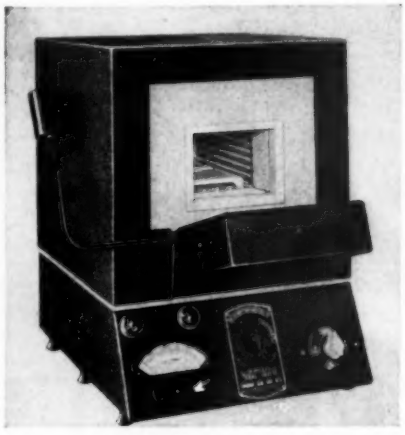
WE WAREHOUSE

Purite • Goulac • Glutrin
Bentonite • Silica Flour
Soapstones and Talcs
Truline Binder

The Smith Facing & Supply Co.
1857 Carter Rd., Cleveland, Ohio

plunger, hydraulic pressures up to 20,000 lb can be obtained with a maximum air pressure of 100 lb. Pump is not intended for use where continuous flow of liquid is required.

Furnace: K. H. Huppert Co., 6830 Cottage Grove Ave., Chicago 37—Automatically-controlled electric furnace has been developed for precision use in laboratories, small unit and batch production work. Combination three-way heat range switch and an automatic temperature timer maintain constant temperatures from 200 to 1800 F, with minimum variation of not more than 10°. Furnace may be brought to heat fast or slow as desired; maximum operating temperature is 2000 F. Built-in temperature controller and heat range switch, pyrometer, two porcelain loading trays, and two pilot lights for indicating operation of the furnace are included as standard equipment. Work chamber measures 4¾ x 3¾ x 9 in. Overall measurements are 19 x 21 x 21 in. Furnace throat is 2 in.



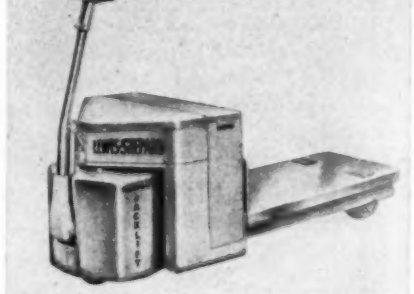
Die Steel: Vanadium-Alloys Steel Co., Latrobe, Pa—New free machining die steel is made with a composition that has proved successful for plastic molds and for die casting dies for white metal alloys. Free machining quality permits hardening the steel before machining. The steel is furnished in the annealed state or heat treated within the range of 250 to 235 brinell, as specified, and is capable of being treated to very high hardness when necessary.

Gear Lubricant: Texas Co., 135 East 42nd St., New York—New lubricant, called Texaco No. 2-X Fluid, containing a base material which has high adhesiveness, cut back with noninflammable solvent, is efficient and easily applied by brushing or spraying on open gears.

Metal Cutter: Arcos Corp., 1515 Locust St., 463 Gulf Bldg., Philadelphia 2—New method for hand cutting or piercing stainless and stainless clad, alloy steel, aluminum, bronzes and brasses, cast iron, Monel, Inconel and nickel combines an electric arc and a stream of oxygen. The new process is known as the Arcos Oxyarc process. Equipment consists of a specially designed holder and a tubular coated rod which is consumed in the process of cutting. Cutter will operate on ac or dc.

Electrodes: Electric Welding Division, General Electric Co., Schenectady, N. Y.—Stainless steel electrodes in a full range of grades and diameters are available in two types of coatings—one for ac or dc use, the other for reverse polarity dc. They can be used in all welding positions. Stability of the arc and deposition characteristics assure flat fillet welds and good directional control. Electrodes are available in the following sizes: 1/16, 5/64, 3/32, 1/8, 5/32, 3/16 and ¼ in.

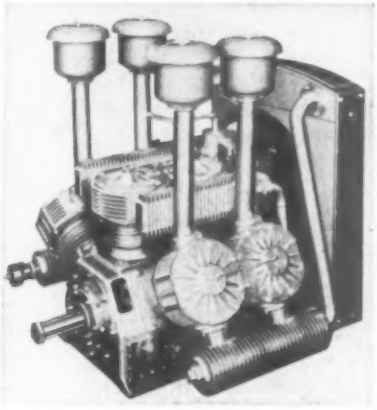
Power Lift: Lewis-Shepard Products Inc., 248 Walnut St., Watertown 72, Mass. — Electrically-operated hand lift truck comes in two models—the platform (shown here) and the pallet. Every operation of the truck can be performed with the handle vertical. All button controls are located in the handle head, and handle has a steering arc of 200° in any position. Both models are driven by an easily replaceable electric master drive unit with gear drive and all wheels are mounted on ball bearings, totally enclosed and packed in grease. Trucks are available in several lengths, and platform truck in wide and narrow models.



Disc Cement: Kindt-Collins Co., 12651 Elmwood Ave., Cleveland 11—Easy to apply and easy to remove and having especially strong adhesive powers are qualities claimed for this new disc cement used for applying cloth-backed and flexible paper discs to steel disc

grinding machines. It is not designed for heavy fibre-backed discs. The cement is available in quart cans only and will not deteriorate if the container is kept tightly closed.

Compressors: Davey Compressor Co., Kent, O.—New line of air-cooled portable compressors includes five models of 60, 105, 160, 210 and 315 cfm ca-



pacity. All units are V-type cylinder design, except the Model 315 (shown here), which is of W construction with four low-pressure and two high-pressure cylinders. Units have aluminum alloy compressor heads, manifolds and crankcases for lighter weight and greater heat conductivity. Compressors are available in skid, steel wheel, pneumatic tired trailer and flanged wheel units.

Conveyors: Bosworth Engineering Co., 6723 Denison Ave., Cleveland 2—Self-powered, lightweight, endless belt conveyors come in two styles. The Moto-Trimmer, suitable for handling sand, gravel, coke, small machine parts and other foundry materials, has capacity of 40 to 75 tons per hour. Source of power is optional, and conveyor will discharge materials up to 6 ft in height. The Conveyall is a cleated belt loader which will handle anything from 300 mesh material up to large size cartons. Loading chute can be adjusted to variable heights. The conveyors are rigidly constructed, easy to handle and can be operated by one man.

Grinder: Hisey-Wolf Machine Co., Cincinnati 25—Wet grinders are available in sizes for 10, 12, 14, 18, 20, 24 and 30 in. grinding wheels. Machines come in one or two-wheel models. In two-wheel models both wheels can be used for wet grinding or one for wet and one for dry operation. These new models have improved bearing seals, settling chambers

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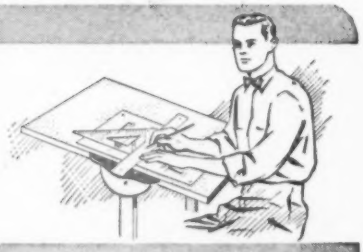

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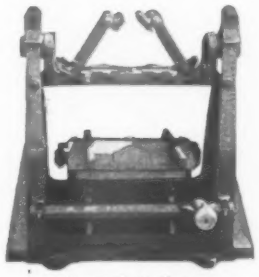

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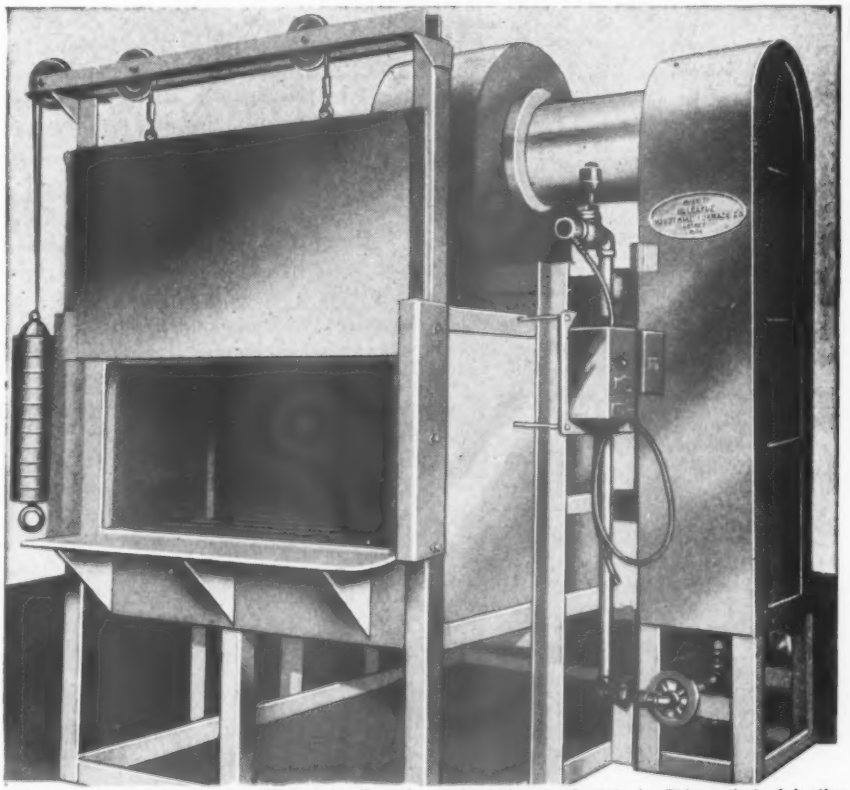

Bellevue batch type furnace for the heat treating of aluminum alloys, consists of atmospheric type burner mounted on the lower end of the duct which is used for recirculating the air back into the furnace. Garden City high temperature fan is standard equipment for recirculating the heated air. This method of heating holds temperature with little or no variation. Mounting the burner in the duct eliminates the necessity of an extra heating unit. . . send us your heat treating problems. . . our engineers will make a proposal without obligation.

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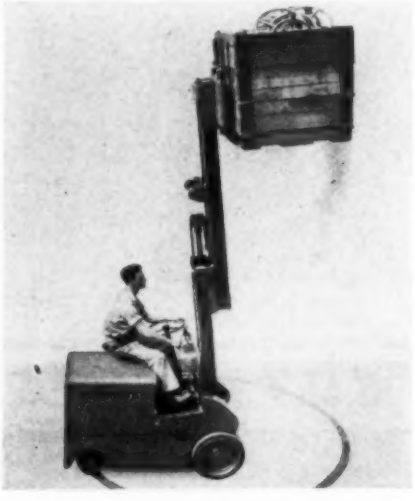
and other improvements. Motor is mounted on rear of pedestal with V-belt drive to spindle. Pump is self-priming with individual control valve for each wheel for providing wet grinding fluid.

Fork Truck: Automatic Transportation Co., 121 West 87th St., Chicago 20 — Telescopic, tilting, hydraulic lift electric fork truck will lift 4000 lb 130 in. yet its 83-in. collapsed height permits it to pass through a regular 7-ft door.



Operating controls are similar to those on an automobile, permitting the operator to ride and drive. Features of truck are automatic acceleration, dead man controls, one of which completely brakes the truck when the driver leaves the seat, and modern mechanical design.

Dust Collector: A g e t-Detroit Co., Ann Arbor, Mich.—Recirculating type dust collector can be installed in 1 hr and requires only 8 sq ft of floor space. Unit consists of motor driven suction and cleaning unit, a stand for supporting it, two roller cans and a means of quickly connecting or disconnecting the cans to the dust discharge of the air cleaner. The unit draws dirt laden air through a paddle wheel fan into a cyclone separator, removes the dirt and recirculates the cleaned air into the working area. Unit is rated at 1400 cfm on a single 6-in. inlet and has dust storage capacity of 66 gal.

Die Lubricant: G. W. Smith & Sons Inc., Dayton, O.—New lubricant developed for Zamac or zinc alloy die castings provides a clean, satin-smooth surface finish on the castings. It is a colorless, odorless compound that is nonstaining, noncorrosive, noncarbon-forming and causes no objectionable smoke or gases. It also eliminates scoring, sticking; aids easy ejection of the casting; prevents formation of zinc oxide on the core pins and die cavities, and leaves no undesirable deposit on the casting that might prove detrimental to subsequent plating.

Furnace: Detroit Electric Furnace Division, Kuhlman Electric Co., Bay City, Mich.—Company has added a larger model to its line of type indirect arc rocking electric furnace which will melt up to 900 lb bronze or 500 lb cast iron per hr. It is rated 150 kw with 500 lb nominal cold charge capacity and is available with attached electrode brackets and mechanical automatic electrode control, or pedestal mounted electrode brackets with automatic hydraulic control.

Precipitator: Koppers' Bartlett-Hayward Plant, division of Koppers Co. Inc., Baltimore—Precipitators are designed for maximum removal or recovery of solid or liquid particles from industrial and waste gases, and are engineered specifically to the needs of individual plants to provide any desired efficiency. The apparatus will remove boiler fly ash, tar, acid mists, soda ash, fluorides, catalysts, dust, and other nuisances or valuable by-products.

Pump: Construction Machinery Co., Waterloo, Iowa—Centrifugal type pump has been redesigned for lighter weight and uniform wall thickness throughout pump case and other parts. Pump has

double shaft seal with flexible neoprene diaphragms, hardened ball bearing steel rotating seal surfaces, and stationary bronze seal plates. Large pump case and dual prime construction assure fast priming. Trash type impeller and streamlined case are of nonclogging design.

FOUNDRY PROGRESS DURING 1946

(*Continued from page* 95)

Founders' Society last summer.

A further understanding of the problem of graphitization and what to do about it has been given to the industry by a number of investigators. A few purchasers of steel castings have prepared specifications which have required the regulation of aluminum content during the deoxidation of the molten steel, but from developments in controlling use of alloys it seems that the aluminum deoxidation requirements is not the entire story.

Research is being conducted along purely fundamental lines such as gases in steel, and homogenization heat treatments to assist in quality control of the product. A very excellent report has been prepared by Carnegie Institute of Technology for the Steel Founders' Society on the austenite grain size of cast steels. These studies indicate that five methods may conveniently be used simultaneously in measurement of the austenite grain size of carbon and low alloy cast steels. These methods are martensitic etch, gradient quench, normalizing, fracture, and oxidation. The martensitic etch method gives correct results and is the most consistent in revealing the austenite grain size of the methods studied. Its use as a routine foundry laboratory test is recommended.

Rising Costs Stimulating Foundry Modernization

By JOHN HOWE HALL
Consulting Engineer
Swarthmore, Pa.

A MAJOR part of the efforts of management in the steel foundry industry has been directed toward modernization of plant and installation of mechanical handling devices, with a view to keeping down costs in the face of rising labor rates. This is true not only of the shops making large quantities of castings from a relatively few patterns, where mechanization has already been carried very far, but of the jobbing shops as well. Of course, complete mechanization of such shops is not considered desirable, or even possible in some instances, but nevertheless the old hand methods have been largely eliminated in a considerable number of the more progressive companies, and others will no doubt have to fall in line if they are to meet competition in the face of steadily mounting prices for raw materials and labor.

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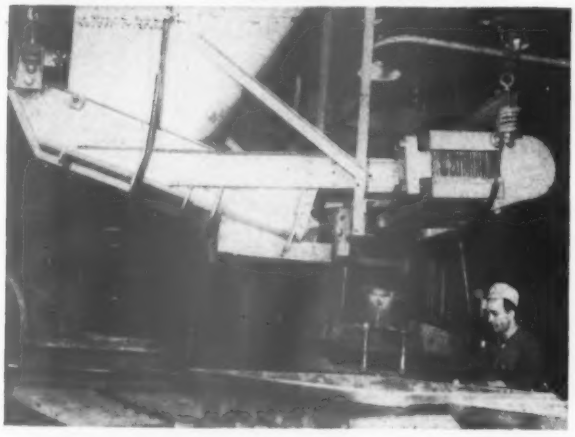

Speed Up Material Handling

Rheostat control of volume flow of coal, limestone and sand—a gushing torrent to a trickling dribble—from track hoppers onto belt conveyors, at molding stations, to mixers, or adding alloys to the ladle stream.

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and its numerous modifications has made continued progress, especially in foundries making medium size and small castings. Some difficulties have cropped up in applying this method to some of the special steels, but these are being cleared up. The economy of metal made possible by this method, and especially the economy in grinding and chipping costs, commend it to progressive foundrymen.

The same thing is true of the Washburn or "Necked-down" head, a revival of a method originally introduced some 40 years ago but temporarily discontinued when the oxygen-gas cutting torch was developed and made it possible to cut off even very heavy heads economically. Rising labor costs have revived interest in this method, which leads to considerable reductions in grinding and machining time. A recent investigation by the research committee of the Steel Founders' Society of America into the proper design of these heads and the best methods to use in employing them, has greatly stimulated interest in the subject.

Centrifugal casting methods, which were much to the fore during the war years, have gone a little into retirement as further work with them has served to bring out their disadvantages and limitations. This is more true of what are called centrifuging and semi-centrifugal casting, than of true centrifugal casting about a vertical or horizontal axis, where castings of the general shape of a tube are produced without any central core in the mold.

Temperature Investigations

The extending use of steel castings at sub-zero temperatures has stimulated investigation into the best compositions and heat treatments to produce steels with high strength and shock resistance in this type of service. Simultaneously, the problem of graphitization and consequent embrittlement of castings used at high temperatures has continued to command the attention of metallurgists interested in the production of valves, fittings, etc. for high temperature applications. The addition of small amounts of chromium to the existing low-alloy compositions is at present the favored solution, but the last word has by no means been said on this head.

A start is being made in introducing requirements for hardenability in specifications for steel castings for special applications. This is but a part of the general tendency to eliminate from specifications, requirements for composition, etc., and substitute clauses that call for the properties desired in the metal. The extending use of full ranges of heat treatment in steel casting practice, including liquid quenching and tempering, is of considerable interest to those who, like the undersigned, pioneered in these methods some 40 years ago in the face of dire predictions of disaster.

The steel casting industry has welcomed the publication of an authoritative text on *Metallurgy of Steel Castings* by C. W. Briggs, technical and research director of the Steel Founders' Society of America. It was high time that such a volume was produced, bringing the subject up to date, and summarizing the great progress the industry has made in the past few decades, and this volume therefore fills a long felt want.

Casting Is Logical Process For Crankshafts

By H. L. DAY
Auto Specialties Mfg. Co.
St. Joseph, Mich.

THE stimulus given to cast ferrous metals by the recent war requirements, produced an unforeseen degree of improvement in the manufacturing technique of the cast metal industry. The demands of our current peacetime economy have not in the least relinquished the quality pressure, but on the contrary, have served only to accentuate it.

The automotive engine in our current passenger car and truck models, in general, appears conventional and with almost imperceptible changes over prewar engines of similar duty. But this condition can be expected to remain static only as long as the present day production effort in the manufacture of automotive vehicles is absorbing such large quantities of our materials and so much of our manpower.

However, it can be predicted with certain assurance, that when the automotive industry finally catches its production breath, our engines will be changed in design and principle and finally brought in tune with our advancing fuel, lubricant and highway technology.

One of the major factors that narrows the scope of development of new designs in automotive power plants, has been the limitations imposed on crankshaft design through the use of wrought metals. The general shape, timing, weight distribution, bearing loads, physical properties and heat treatment, all must be confined to relatively narrow limits, denying the designing engineer many features that otherwise he would like to use.

Irrespective of design or material requirements, crankshafts now can be expertly manufactured, on commercial and economical bases, most logically through the use of electric alloy steel castings, made in accurately prepared and assem-

bled molds produced in dry sand.

Special procedure techniques, reaching the present peak through gradual development over a period of 13 years and represented in several millions of automotive vehicles, provide the automotive engineer an almost unlimited choice of design for the mechanical needs of his crankshaft. In addition, there is permitted a most useful category of metals for his physical requirements. He will be unfettered with the traditional but laborious and expensive development that attends the design development of crankshafts in wrought metals. No longer will he be faced with the limitations imposed on bearing life by the singularly few wrought metals that are adaptable to hot forming. The spectre of warped crankshafts and the tedious but uncertain operation of cold straightening, after machining, or after the bearing surfaces have been subjected to special hardening treatments, is no longer an unavoidable nightmare. All of these things are now made available because there is a precisely developed technique for the manufacture of cast alloy crankshafts.

Developed During War

Much of the know-how of this process emerged from a war effort in which many thousands of armor piercing projectiles approximately 100 lb in weight were cast to shape of electric alloy steel and hardened to permit penetration of the plate. These were manufactured successfully in the face of absolute failure of similar castings processed otherwise, and in competition with forged projectiles of the same chemical composition, in which castings eventually excelled.

From the completely controlled process of projectile production to the precise casting of alloy metal crankshafts, was a large but in nowise uncertain step. This development has been carried on until now it is possible that the process will be in no small way responsible for the improved automotive vehicles we are impatiently anticipating.

The variations in design that can be obtained in a split die or mold have reached a level beyond which it is unlikely that important progress can be made. Through dry sand composite molding, it is possible to pick up where the previous processes have left off, and provide the automotive engineer with the designs that will be important factors in tomorrow's cars and trucks. With actual case histories showing reductions in weight up to 30 per cent over split die wrought cranks, it is perhaps an unexpected feature to find that a great deal of tedious machining has been eliminated, due mostly to close clearances, but also

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Typical two-compartment, recirculating type core and mold oven; oil burner fires into chamber at rear of oven, whence air is drawn into drying chamber.

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Foundry Chill Nails are made for chilling. These high quality nails warrant a trial.

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to the elimination of the draught that appears in the conventional split die product.

It is obvious that the plastic characteristics of metals have no effect on the cast alloy process, and thus, there is offered an almost unlimited array of alloys that can be successfully formed into crankshafts through casting. One type of composition, with three selectable variations, produces alloys that provide not only strengths and stiffnesses indistinguishable from the few traditional steels now used, but in addition, provides definite inherent wear resisting properties and damping qualities not obtainable in our wrought metals.

An effective heat treatment has been designed for quantity production of the numerous designs of crankshafts. Employing the most modern temperature control, with a completely continuous cycle, this treatment is three-way in action, taking full advantage of the contained alloy combination, to product high physical through effective homogenization, in which the crankshaft is straightened through natural relaxation. Then, through the use of a controlled quench of slow velocity, there results a crankshaft with residual strains of such a low order, that straightening is never required after machining.

When it becomes necessary to produce quantities of special parts for radically different automotive power plants, the cast alloy crankshaft experience will lend itself readily to the manufacture of high speed rotors, heat resistant chambers, and high strength members, predicted by farsighted automotive engineers.

Precision Castings Finding Broadened Applications

By W. O. SWEENY
Haynes Stellite Co.
Kokomo, Ind.

SINCE V-J Day, the precision casting process has had opportunities to prove what it can do as a tool for modern industry. Like many new processes, it was originally looked upon as a cure-all; however, it is now generally recognized that precision casting is best suited to production of shapes that cannot be economically obtained by conventional methods of manufacture, or to alloys that are not readily machined, forged or formed. Precision casting cannot compete on a price basis or on dimensional accuracy with parts made by screw machines, coining, stamping, die casting or other established means of quick, cheap reproductions.

Many claims have been made of the close tolerances that can be obtained by precision casting. True, tolerances of 0.002 or 0.003-in. can be produced on small parts under closely controlled laboratory conditions. However, it now appears that commercial tolerances of plus or minus 0.005-in. per in., with a minimum of plus or minus 0.003-in. can be maintained on the majority of parts supplied in production quantities. When closer tolerances are required, a finishing operation is generally necessary. Perhaps the fullest advantage can be taken of precision casting by casting profiles to size and finishing bearing surfaces or other close tolerance surfaces by grinding or machining.

Much of the early impetus for precision casting was in the production of turbo-supercharger buckets, and later, gas turbine parts. The gas turbine field still continues to be a natural application for this method of manufacture since airfoil contours of materials hard to machine, forge or form can be economically obtained. In addition, the physical properties of precision-cast high-temperature alloys are particularly suited to withstand temperatures above 1350 F. At present, most gas turbine manufacturers are using precision-cast stainless steel for the stationary axial flow compressor blades; 25-20 stainless steel or Stellite alloy No. 21 for nozzle vanes; and one of the cobalt-base Haynes Stellite alloys for the turbine blading.

Made in Wide Variety

In the past year precision casting has already asserted itself as a manufacturing process, and many parts of intricate shape have been precision-cast and successfully used. An idea of the wide possible application for precision casting is conveyed by the fact that numerous items are being regularly cast by this method—horseshoe caulks, zipper slides, peach pitters, golf club heads, canning machine parts, tool post wedges, shot gun and rifle parts, chicken wire twister gears, surgical and dental instruments, mining machine parts, mechanical milking mechanism bodies, calculating machine parts, diesel engine precombustion cups, textile machine parts, aircraft engine exhaust couplings, propeller hubs and aircraft "hardware."

The precision casting process has opened up a brand new era for the design engineer, for he can now use alloys that were not previously available because they could not be readily made into the desired shape. Furthermore, he now is not limited to designs that can be made only by conventional methods. Precision casting has made possible the fabrication of intricate contours and shapes that formerly were not practical with any alloy on a production basis. For ex-

ample, in the steam turbine field, the design engineer was limited to shapes and to alloys which could be readily milled or extruded. Now he can design for maximum efficiency by putting in all the desired angles and using a super alloy for higher temperatures and pressures because the part can be cast by the precision method. We confidently expect revolutionary developments in all kinds of machinery as designers become aware of the potentialities of this new mass production process.

GOOD HOUSEKEEPING AND MAINTENANCE

(*Continued from page* 93)

at a much lower cost and there will be less likelihood of accidents. The kind of housekeeping in a shop reflects the kind of management it has.

Supervision—After the management has set up the standard of good housekeeping it must sell it to the supervisory organization, as these are the men who will put it into practice. This should not be too difficult if properly presented, because it is the duty of supervisors to carry out the policies of management. They should be so thoroughly indoctrinated in the value of good housekeeping that it will be second nature for them to work at it daily in their own departments. Their enthusiasm for an orderly and clean shop is contagious and will be reflected in the interest of the workmen. Elbert Hubbard once said: "The spirit exhibited in any organization is but the reflected shadow of one man."

If the supervisor has been thoroughly instructed in the principles and advantages of good housekeeping he will carry it out from a full understanding of the value of the results to be obtained and no doubt will initiate practices in his department based on that knowledge. He is the one on whom the management must depend to teach the program to the workman.

The Workman—Assuming that the supervisors have been properly instructed the next and perhaps one of the most difficult steps is to instruct the workman. This is the job of the supervisor, primarily the worker's immediate foreman. This may require infinite patience and keeping everlastingly at it on the part of the foreman until the man is convinced that it is the right way to work. The objective of the foreman should be to have the man realize that it is to his own advantage to work in accordance with the program. If he can accomplish this end, much of the foreman's troubles will be over. However, he must daily keep the program in mind to pre-

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vent the men from slipping back into the old slipshod methods.

Whenever possible, hasty instructions should not be given, but rather the reasons for the safe, orderly or cleanly practice should be shown the man. A man thus instructed will likely react properly to that instruction and will probably need less personal attention in the future.

Inaugurating and carrying out of a successful good housekeeping program involves the three groups mentioned, and each has a definite contribution to make to the program, as follows: First, the management who must inaugurate the program and provide the necessary money for equipment, materials and labor for the facilities needed in the program. Second, the supervisory group who after being properly instructed see to the carrying out of the program and the instruction of the workmen. Third, the workmen for whose benefit the program is inaugurated.

The Program—The first move in a shop in which little attention to good housekeping has been given is *not necessarily* the installation of elaborate ventilating and dust removal equipment or other new equipment. The start should be made in getting some semblance of orderliness in the shop. Clear up the working floors of unnecessary materials and equipment. Have a place for tools, etc., when not in actual use. Get everything out of the working spaces that is not actually needed at the time and store it in proper order. This will provide more usable and safer working space. In some cases it may even provide space for more production. There is no doubt that it will improve the efficiency of the department and tend to reduce the accident rate.

A major portion of this clean-up campaign can be conducted at a nominal expenditure. Provision of additional shelving, bins, etc. for storing materials and equipment need not be too costly. Removal of accumulations of dust on floors, equipment, walls, trusses, etc., is mainly a matter of labor. Various methods may be followed. In places where it is possible, the fire hose may be used. In other places compressed air may be better, while in still other places the brush and shovel method may be indicated. When dry dust is handled, insist on the men using good respirators. A plant which has a vacuum installation has perhaps the best equipment for this work.

Dust removal will probably disclose where liberal use of the paint brush or spray gun with some light colored paint will improve the appearance of the plant and increase the reflection of light.

After this cleanup has been accomplished it is up to the supervisors to see to it that the shop is kept clean and orderly. This is an every day job. Dust may be kept down by judicious sprinkling of floors. Dust on floors is continually being stirred up by men walking through it.

The use of the air hose for blowing dust from castings, patterns, clothing, etc. should be strictly prohibited not only from the standpoint of cleanliness but because it may be dangerous, since the particles of sand are carried with great force and may be driven into another workman's eyes causing an eye injury.

Without elaborating further on details, suffice it to say that the properly trained supervisor will see many ways of keeping his department neat and clean.

Some companies help in maintaining interest in their good-housekeeping program by having a monthly competition between departments. An inspection is made by a committee and a plaque or banner is presented to the department which shows up best. This award is usually hung in the department and kept until some other department produces a better record at the inspection.

A suggestion box open to all workers is a good means of getting ideas for improvement.

I want to reiterate that much in the way of orderliness and cleanliness in a foundry can be accomplished without a great expenditure of money. Hence, there is no excuse for any foundry organization not following our slogan "Make the Foundry a Better Place in which to Work." Did you ever hear of the word inertia?

After this campaign of clearing up and cleaning up has been carried out, management will be in a better position to study improvements in plant layout and equipment. Many of the obvious things will have been accomplished and the studies for further improvements can be made more intelligently.

State Codes—In many states, codes have been adopted relating to the equipment, maintenance, sanitation and control of dust and fumes in foundries. In some states committees of foundrymen and members of the AFA have been actively working with the state agencies in an effort to have these codes reasonable and practical. In the states where these codes are in operation it is incumbent on management to operate in accordance with their provisions. Primarily they are intended for the health and safety of the workers; in other words, they have been set up to force companies to maintain good housekeeping in their foundries.

Perhaps some of the regulations may seem too stringent to some of us but this may have been brought about by those

who paid little or no attention to good housekeeping in days gone by.

A study of the requirements of the code and a sincere interest in the health and safety of the workmen will indicate to management what improvements should be provided, such as: Improved general ventilation of the plant, removal and collection of dust at the source, vacuum cleaning systems, smoke and fume removal, more daylight in the shop, adequate artificial lighting, safe walkways, proper provision for first aid in case of accidents, proper and adequately maintained safety equipment, to mention only a few. AFA bulletins can be of great help in the study of these problems and should be in the library of every foundry. They have been prepared by committees of experienced men of our industry to whom we owe a debt of gratitude for their unselfish labor.

Maintenance—The general subject of foundry maintenance has been well covered in papers presented at several AFA conventions by such men as W. G. Bliss, F. J. Dost, the writer and others. However, I want to discuss briefly the importance of proper maintenance to the good housekeeping program.

In the days when foundry work was done almost entirely by hand the maintenance man was not a very important cog in the wheel, but with the mechanizing and electrifying of foundries the maintenance department has become one of the important departments. A well organized and properly equipped maintenance department is a real asset to any foundry. But it should be a real maintenance department and not merely a repair department. By this I mean that it should be equipped to carry on a continuous program of preventive maintenance and not merely to repair equipment when it breaks down. It should carry on periodic inspections of all buildings and equipment, provide spare parts and materials so they will be ready when needed, see that proper lubrication is taken care of, operate several service departments and, in fact, carry on the many other duties which are necessary for the continuous operation of the plant and its equipment.

A well maintained plant is one of the essential features of a good housekeeping program. Conversely, good housekeeping tends to lower the maintenance cost of the plant.

Perhaps the most important phase of a maintenance department's work is to carry on a continual campaign of preventive maintenance. This requires inspection of equipment at regular intervals to detect wear, misalignment, etc., to see that proper lubrication is given, to have the equipment cleaned with sufficient frequency, and to perform the pro-

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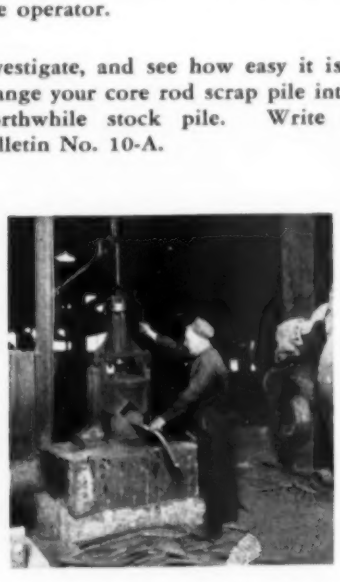

Installation photograph shows the Rod Straightener in action.

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CORE ROD STRAIGHTENER

verbial "stitch in time" to prevent expensive repairs if possible.

I like the way Fredrick Waldron expressed it: "The purpose of plant maintenance is to anticipate and prevent, to the greatest possible extent, interruptions in operation and loss of output due to bad order or broken-down machinery and equipment in a manufacturing concern."

To do this the department must be well organized, have sufficient personnel and adequate facilities for performing its work. How many shops have we seen where the maintenance department is relegated to some dark and inadequate corner because someone up above did not realize the importance of the work these men were doing. Stop and consider for a moment the immense investment for the buildings and equipment these men have under their care.

It is a wise company which provides a separate shop for this department with the necessary tools and equipment and large enough for the storage of spare parts, motors, etc. This provision not only improves the efficiency of the maintenance department but is in line with good housekeeping. Instead of spare parts being scattered all through the plant they will be kept in the maintenance shop and, of course, be better taken care of. The parts can then be properly catalogued and at a moment's notice the maintenance men can find out whether they have the needed part and where it is located.

Is Manager's Best Friend

Size of the maintenance crew and the facilities they require are determined by the size and extent of mechanization of the foundry. No matter how large or how small the department, it should be properly organized to perform the various functions of inspection, repair and operation required of it.

In too many foundries the maintenance department is looked upon as a sort of necessary evil, an appendage or a fifth wheel which we wish we could get along without, probably because it is considered a nonproducer, instead of an inherent part of the organization. Properly handled it can be the operating manager's best friend in keeping the plant and equipment in operation.

It should be emphasized that the maintenance department's work is important in the overall good housekeeping program and that good housekeeping, i.e., orderliness and cleanliness, will have a marked effect in reducing the maintenance costs in a foundry.

The good housekeeping program undoubtedly has its aesthetic and humanitarian features and this is fine, but do not forget that it has its economic value also. Consequently, there is no excuse for any foundry executive not getting on the band wagon, which is fast gaining momentum, so that the day will soon arrive when we can say that every foundry in the country is "a good place in which to work." We shall then be able to attract more of the kind of workmen and technicians the industry wants.

Gray Iron Advisory Group Named

Appointment of an advisory group to the Gray Iron Division of the American Foundrymen's Association has been announced by the division chairman, T. E. Eagan, chief metallurgist, Cooper-Bessemer Corp., Grove City, Pa. Members of the new committee are:

A. L. Boegehold, head, metallurgical department, Research Laboratories Division, General Motors Corp., Detroit; John Bolton, metallurgist, Lukenheimer Co., Cincinnati; H. Bornstein, director, testing and research laboratories, Deere & Co., Moline, Ill.; V. A. Crosby, metallurgical engineer, Climax Molybdenum Co., Detroit; R. F. Harrington, assistant works manager, Hunt-Spiller Mfg. Corp., Boston; Max Kuniansky, vice president and general manager, Lynchburg Foundry Co., Lynchburg, Va.; C. H. Lorig, metallurgist, Batelle Memorial Institute, Columbus, O.; J. T. MacKenzie, metallurgist, American Cast Iron Pipe Co., Birmingham; G. P. Phillips, chief metallurgist, automotive foundries, International Harvester Co., Chicago; Donald J. Reese, head. Iron and Nonferrous Casting Section, International Nickel Co., New York; F. G. Sefing, research metallurgist, International Nickel Co., Inc., New York, and E. K. Smith, consulting metallurgist, Beverly Hills, Calif.

To Publish Metal Progress History

Engineering Foundation, 29 West 39th St., New York 18, will record advances in ferrous metallurgy made during the war in a series of books to be published by the Alloys of Iron Research, a project of the foundation. The first volume, now in preparation under the direction of Frank T. Sisco, will contain a description of the characteristics and properties of the many new alloy steels developed during the war, and a summary of new principles of plastic deformations at elevated temperatures.

Succeeding books will be broad discussions of available published and unpublished information on individual series of new steels, and on older steels that have been greatly improved in properties in the last few years.

NEW TRADE PUBLICATIONS

LADLES: Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.—44-page catalog describes and illustrates the company's line of ladles. Special emphasis is given to the various types of gear brackets and the Pour-Rite ladles which feature air-cooled trunnions. Ladle handlers and monorail pouring systems are discussed.

CRUCIBLES: Crucible Manufacturers Association, 90 West St., New York 6—"Crucible Melters' Handbook" contains information on crucible furnaces, and fuels, and gives information on charging, storing and handling crucibles. It also contains tables of alloys, melting points of many metals and dimensions of standard size crucibles.

WIRE ROPE: Preformed Wire Rope Information Bureau, 520 North Michigan Ave., Chicago 11—Results of a survey among wire rope users are published in a booklet which states that wire rope is purchased on the basis of length of service and porformance and that preformed rope best meets these requirements.

CONVEYOR: Rapids-Standard Co. Inc., Dept SH-93, 308 Peoples National Bank Bldg., Grand Rapids 2, Mich. — Bulletin describes two special devices—one to facilitate sorting and rerouting of products to a spur line in a conveyor line; the other has a hinged section to permit passage through a conveyor line without removal of sections. Specifications and prices are listed.

REFLECTOR LAMPS: Lustra Corp. of America, 40 West 25th St., New York 10—Bulletin 101 describes neck-silvered directs and concentrators, side-silvered tubulars and various floodlights and spotlights. Construction features include solid silver reflector linings sealed inside the bulbs, neck-reflector disks, precision-focused filaments and daylight spray where desired. Sizes are 25 to 1000 watts for 115 to 125 v, and up to 250 v on the general lighting service types.

ALUMINUM ALLOYS: Federated Metals Division, American Smelting & Refining Co., 120 Broadway, New York 5—44-page reference book, "Aluminum Casting Alloys," contains data on specifications, mechanical properties and foundry characteristics of aluminum alloys. Chapters present information about the effect of copper, silicon, magnesium and other alloys as well as heat treatment, aging treatment, laws of gas absorption, gas removal, shrinkage, cracks, dross and other pertinent information.

SULPHUR ANALYSIS: Laboratory Equipment Corp., 720 East Main St., Benton Harbor, Mich. — Bulletin describes new high temperature combus-

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tion method of sulphur analysis which was recently adopted as tentative standard by the Bureau of Standards. Equipment required for the tests is illustrated and described.

SANDER: Woods Engineering Co., Norwalk, Conn.—Catalog Sheet 46-1 describes company's belt sander and tool grinder for wood, metals, plastics, glass, rubber, tool grinding, deburring and finishing of small parts. It is adjustable for horizontal or vertical operation and has a platen work area of 5 x 8½ in., 4 x 36 standard abrasive belt and 4 x 4½ in. machined aluminum, ball-bearing pulleys tested to 5000 rpm. Sander is provided with thumbscrew control for belt tracking and tension, work dam adjustable to any angle and work platen which can be used on either face.

HYDRAULICS: Honan-Crane Corp,. 656 Wabash St., Lebanon, Ind.—4-page folder indicates methods of lowering time and expensive repairs on hydraulic presses, machine tools, plastics molding presses and machines, die casting presses, balers and injection molding machines, by effective purification of hydraulic oils. Folder discusses hydraulic oil contamination and explains purification methods and types of purifiers available, illustrating typical installations.

CHIEF KEOKUK is a new cartoon character appearing in advertisements of Keokuk Electro-Metals Co., Keokuk,

Iowa, manufacturers of high silicon pig iron. Long ago the chief was a great Indian peacemaker, but today, he is a bright little character with a story for foundrymen.

BEARINGS: Joseph T. Ryerson & Son Inc., P. O. Box 8000-A, Chicago 80—Wall card, "How To Pour Bearings," describes with a series of six cartoon type pictures, the steps necessary to secure good, tightly lined bearings. Instructions are clear and easy to follow.

METAL: Meehanite Metal Corp., Pershing Square Bldg., New Rochelle, N. Y.—Bulletin No. 10, "Meehanite—the Metal for Pressure Castings," describes and illustrates applications of Meehanite castings to pressure work in cases where high pressures are required.

PULLEY: Stearns Magnetic Mfg. Co., 662 South 28th St., Milwaukee 4—Catalog 303 on magnetic pulleys contains descriptive data, specifications, information on selecting for proper size, material, capacities, trajectory charts, use of double magnetic pulleys as well as application suggestions and pictures. Catalog 604-D contains information on magnetic brakes for floor, motor and machine mounting.

SEALANT: American Cyanamid Co., Plastics Division, 30 Rockefeller Plaza, New York 20—Bulletin describes the use of Laminac resin as a sealant for porous metal castings which must be pressure tight. This sealant seals microporous flaws in castings and provides a surface film which will prevent steam corrosion. Methods of impregnating castings are described and illustrated by schematic drawings.

METERS: Roots-Connersville Blower Corp., 701 Madison Ave., Connersville, Ind.—Bulletin 40-B-14 deals with positive displacement meters. Construction features and advantages are discussed and a table of sizes, capacities, and other information is included. Meters are built for pressures of 25, 50 and 125 lb in the standard sizes, and steel-encased meters for line pressures of 300 lb upward are available on special order.

FLAME CUTTING: Joseph T. Ryerson & Son Inc., Box 8000-A, Chicago 80—Illustrated bulletin on flame cutting describes company's facilities for producing plain and intricate shapes from steel plates. A number of typical flame-cut sections are shown along with information regarding the use of irregular shaped steel plates in both production and maintenance work.

GAGE BLOCKS: Fonda Gage Co., Stamford, Conn.—Bulletin 46-P discusses toughness, expansion, wear-resistance, accuracy surface finish, corrosion resistance, stability and wringability of the company's carbide and steel blocks. Prices for standard inch sizes, standard metric sizes and for sets of gage blocks from 6 pieces to 84 pieces are given.

CUTTING MATERIAL: Jessop Steel Co., Washington, Pa.—Catalog describes and illustrates tools, dies, and wear resisting parts made from cemented carbide and a special cast nonferrous alloy. Specifications are given for standard carbide tool tips, tools, and wire drawing dies and for the special cast alloy tool bits.

THERMOCOUPLE: Illinois Testing Laboratories Inc., 420 North La Salle St., Chicago 10—Bulletin 4181 contains descriptive data, specifications and prices of the company's thermocouples, protection tubes, wire and other pyrometer accessories.

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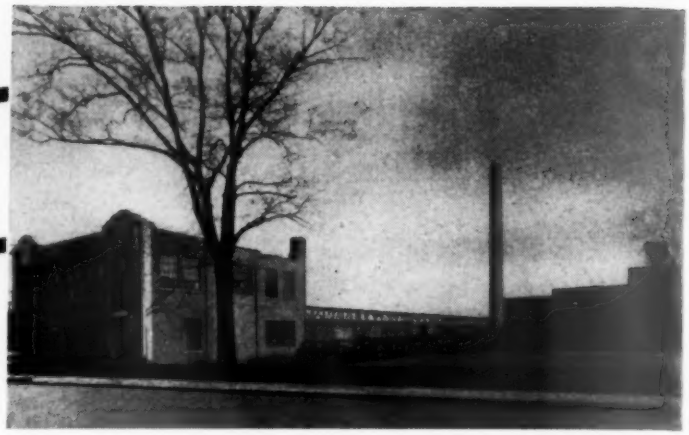

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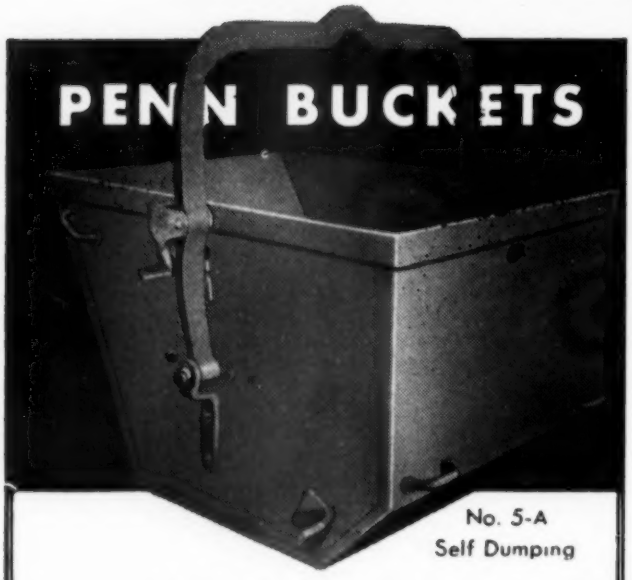

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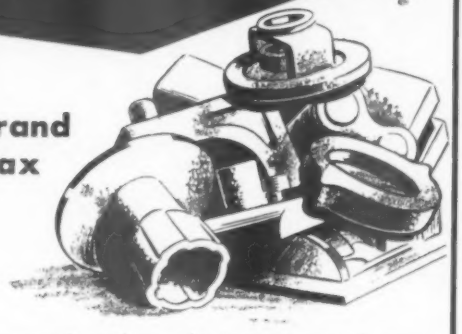

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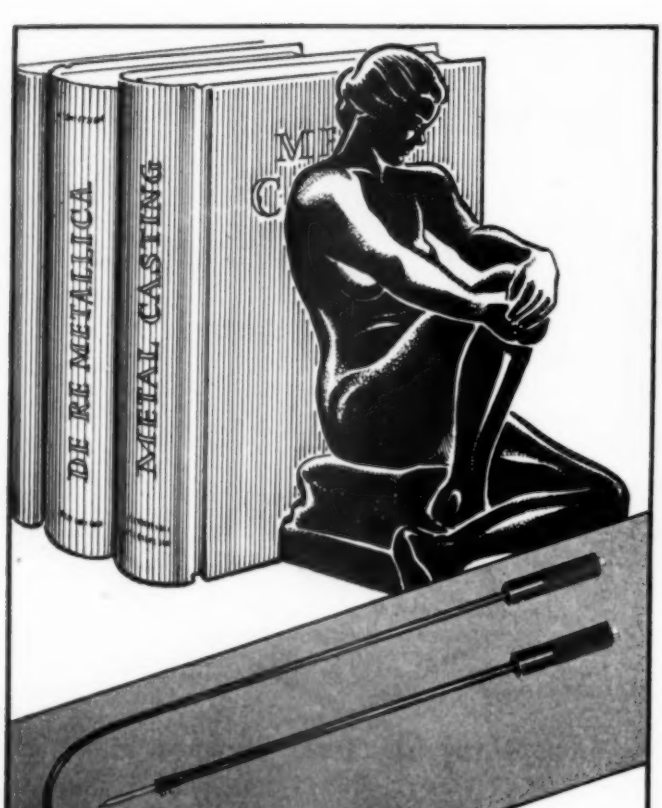

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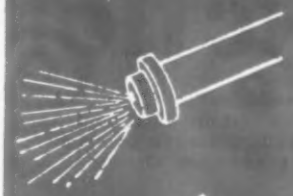

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5. Cleanblast Alloy 99 shot fractures at a much slower rate and into much larger pieces than regular shot. This results in less dust and lower disposal costs.

Sample and Laboratory Service Available on Request

"Alloy 99" SHOT

ALLOY METAL ABRASIVE COMPANY

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PRODUCTION
CORE BLOWER
CORE BOXES

OUR PATTERNS AND CORE BOXES ARE ENGINEERED AND CONSTRUCTED TO REDUCE CASTING COST.

Patterns and Core Boxes are carefully checked before leaving the plant and are guaranteed to give maximum results in the Foundry and Core Room.

Prompt attention will be given your inquiry.

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LIMITED

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SWING FRAME GRINDER

- **BALANCE** Perfect center balance of wheel and motor ensures grinding ease and efficiency.
- **SAFETY** "Worker safety" is carefully provided.
- **ECONOMY** Greasing required only once every six months . . . guaranteed for two years against repairs, exclusive of electrical equipment.

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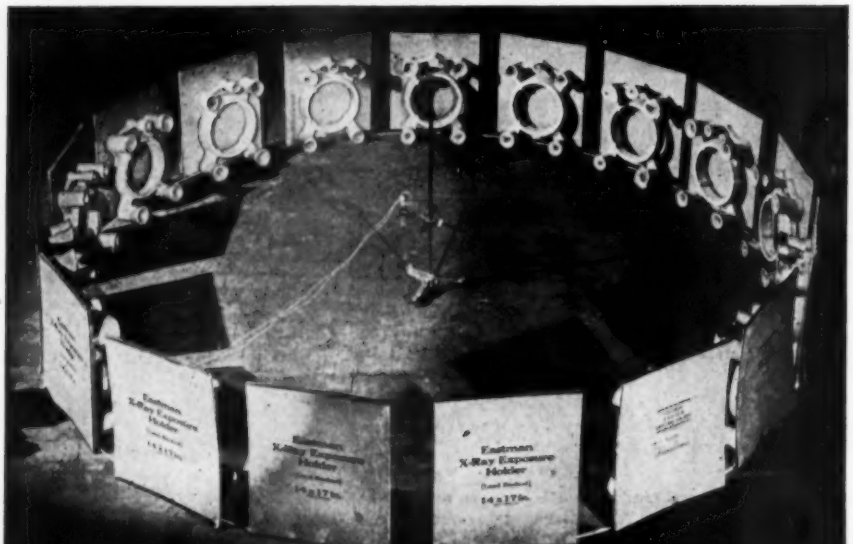
FOX GRINDERS, INC.

OLIVER BUILDING PITTSBURGH 22, PA.

RADIUM RADIOGRAPHY *Performs a* NEW FUNCTION



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Write us concerning any problem of Gamma Ray Radiography

"Directional solidification" can easily be studied by the set-up illustrated in the photograph—to indicate the best method of casting with a minimum of defects in the casting itself.

Radium has become a new foundry tool which directly effects an increase in yield. It permits accurate determination of the proper procedure in gating and risering "tough" castings. Seventeen cylindrical castings were radiographed simultaneously by Crane Co. to ascertain the most productive and economical foundry practice.

Radium thus performs a valuable additional function.

For inspection, for determination of directional solidification, Radium is available in capsules of various unit strength in duralumin holders which may be leased or purchased at low rates.

The rental includes full coverage insurance; heavy lead storage containers and slide rule exposure calculators.

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Sand Packs SOLIDLY Around Head and Stem

PATENTED OPEN HEAD CHAPLET

THIS MEANS RIGID CORE SUPPORT-- Better Castings

This outstanding chaplet is ordered repeatedly by foundries producing automotive, stove and many other types of castings.

We also make Square Head Radiator Chaplets—and Stem and Double-Head Chaplets for heavier work.

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Since 1890

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BRING RESULTS!

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- Have you some used equipment which should be turned into cash?
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THE FOUNDRY
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CORE BOX VENTS

Here's part of a complete line of DEMMLER core box vents—rigidly constructed in varying sizes of slotted brass—slotted steel—and screen mesh. Orders filled promptly from stock!

BRASS SLOTTED CORE BOX VENTS

Slot widths: .010", .013", .018"
Diameters: ⅛", 3/16", ¼", 5/16", ⅜", 7/16", ½", ⅝", ¾", ⅞", 1", 1¼", 1½"

STEEL SLOTTED CORE BOX VENTS

Slot widths: .010", .013", .015"
Diameters: ⅛", 3/16", ¼", 5/16", ⅜", 7/16", ½", ⅝", ¾", ⅞", 1", 1¼", 1½"

SCREEN TYPE CORE BOX VENTS

Mesh: #30, #40, #50.
Diameters: ⅛", 3/16", ¼", 5/16", ⅜", 7/16", ½", ⅝", ¾", ⅞", 1", 1¼", 1½"

SPECIFICATION CIRCULAR ON REQUEST

Wm. **DEMMLER** *& Bros.*
Kewanee, Illinois

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for Handling and Pouring

ALL METALS

TIMKEN-WORM GEARED LADLES

These patented ladles are designed by men with over 30 years of practical foundry experience.

They offer the utmost in Safety, Dependability, Long Life, Ease of Operation, Convenience, Economy and Simplicity.

They are manufactured in all types and sizes, and are arranged for manual or electrical operation.

Our line of pouring and handling equipment is complete, including bowls, shanks, bails and tongs . . . special equipment.

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115 NORTH OHIO STREET . MINSTER, OHIO

"LOW COST, LONG SERVICE, SMALL MAINTENANCE"

says Maurer Supply Co. about

CURTIS AIR HOISTS

The Maurer Supply Co., St. Louis, uses Curtis Air Hoists to raise and lower parts in hot-dip galvanizing work. Among other advantages, they have found that the rigid rod in Curtis hoists eliminates swinging; that the positive control of loads is essential to such work and provides a maximum of safety to the operators. Working under severe conditions of acids and heat, these Curtis Air Hoists are giving "trouble-free service" and enabling this company "to perform an operation impossible without them."

Curtis Air Hoists have a proven record of saving time and labor in many lifting, pushing or pulling operations. They offer:

Low first cost; lowest operating expense.
Smooth, fast, accurate control of loads.
Finger-tip control.
Light weight; cannot be overloaded.
Capacities up to 10 tons.

For complete information on Curtis Air Hoists, Air Cylinders and Air Compressors, write for Bulletin C-7.

CURTIS PNEUMATIC MACHINERY DIVISION
of Curtis Manufacturing Company
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Please send me Form C-7 on Curtis Air Hoists, Air Cylinders and Curtis Air Compressors.

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Superior quality non-ferrous castings are made with the use of

SOFFEL'S NON-FERROUS FLUXES

SOFFEL'S FLUXES remove gases and oxides from the metal by chemical reaction. We have perfected a Flux for every alloy and melting method. None of these Fluxes will change the chemical analysis of the metal since they are free of sulphur, phosphorous, silicon, aluminum, and magnesium. The metal will have greater fluidity and less shrinkage, and will produce castings of greater density, finer grain structure, and increased tensile strength.

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We recommend Soffel's Permanent Mold Coating for aluminum; Klen-Zinc Flux for zinc base alloys; and Soffel's Die Coating for zinc base Die Castings. These materials produce better color on castings, and reduce shrink cracks. Liberal samples furnished without obligation on request.

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Manufacturers of Fluxes and Purifiers for all metals and alloys; also Carbon-Free Liquidizer, an exothermic head compound, and Thermatomic compound.

DOUBLE YOUR PRODUCTION—with the fastest and most powerful Rammer made—

NO. 4 DAYTON RING VALVE BENCH RAMMER

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Aside from its efficiency, the chief advantage of this Rammer lies in its long life. The Valve Unit will last for years without repair or replacement. The Cylinder Bore and Piston Rod are HARD CHROME PLATED, features which double the life of the Rammer and reduce maintenance costs at least one-half.

Have been adopted as standard by some of the largest users of Rammers throughout the Country. MADE IN FIVE SIZES. Send for Bulletin No. 300.

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CONCEALED IN

SKIMMINGS, SPILLS, SLAG, SWEEPINGS AND CINDERS

RECLAIMED AT INTRINSIC VALUE WITH THE

DREISBACH MILL

WILL REDUCE YOUR METAL LOSS TO ABOUT ¼ OF 1 PERCENT

★

ACTUAL SAVINGS WILL AMORTIZE COST WITHIN A FEW MONTHS

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USED BY NONFERROUS FOUNDRIES AND ROLLING MILLS FOR MANY YEARS

Write For Full Information

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NOBODY LOAFS

ON THIS BLAST-CLEANING JOB

Every pellet is a worker when you put AMERICAN Shot and Grit on the job. They're all uniform in size and hardness, so you can expect better cleaning and longer abrasive life. Make sure of lowest blast-cleaning costs — specify "AMERICAN" and benefit from American's own method of controlling manufacture for perfect uniformity.

All sizes graded to new S.A.E. specifications.

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AMERICAN SHOT AND GRIT

The American Steel Abrasives Company

GALION, OHIO

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CASTING MACHINES

To produce ferrous and non-ferrous castings at high production rates with few rejects, and low production costs.

MODEL M HORIZONTAL

Built in six standard sizes with variable speed control. Casts a large range of sizes to 16" diam. and 5' long. Takes flasks for sand molding or metal molds; practically 100% metal yield. Ideal for casting bushings, bearings, cylinder liners, piston ring bushings, etc. Minimum worker fatigue. Write for Bulletin 443.

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a Moisture Meter

FOR FOUNDRY SANDS

An electronic instrument combining advanced electrical science with sound procedure and practical for plant use in most molding and core sands. Quick manual readings, ¼% accurate and either relative or % of moisture when set for one type sand.

Two systems in one unit,—portable, on-the-spot testing or with a.c. when amplification is desired. Constant reading permits possible adaptation to conveyor systems in many cases. Large meter, steel case, 8 x 12 x 6 deep, attractively finished. Special manual type sand prod for density correction. Your sand samples can be meter-tested in our laboratory.

Prompt deliveries. Distributors wanted.

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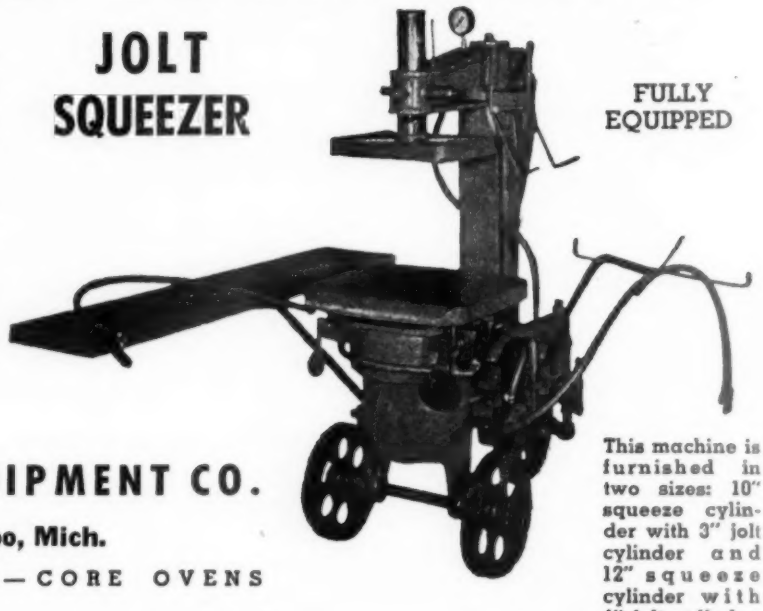
JOLT SQUEEZER

FULLY EQUIPPED

● The post and squeeze cylinder on the HAYNES JOLT SQUEEZER is cast all in one piece. There are no bolts or screws in this machine. The top of the post is machined on top with a 2 7/16" cold rolled shaft which the swing arm swings on.

This is a portable machine with three wheels, two in front, one in back, zerk fittings on all moving parts. Comes equipped with air gauge, pop-off gauge and a pin on top of the arm for a gate horn.



This machine is furnished in two sizes: 10" squeeze cylinder with 3" jolt cylinder and 12" squeeze cylinder with 4" jolt cylinder.

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BLYSTONE • MIXERS •

THE paddle-type mixer for core sand mixing in the foundry. Blystone Mixers offer: low mix cost, thorough mixing, and easy operation. There is a sturdily built type and size for your problem. Send for Bulletin and full details.

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by: C. A. Reams

■ Mr. Reams, engineer, Ford Motor Co., has compiled this practical book from actual shop experience plus proved engineering information. His discussions of modern methods of blast cleaning and ventilating methods are applicable to all types of metal cleaning by the blast method.

Full information is given on selection of abrasives, abrasive cleaning methods, selection of equipment, abrasive reclamation, advantages and limitations, ventilation and reduction of industrial hazards, and scores of other helpful facts.

Illustrations and diagrams in this 213 page book increase its value to the plant engineer. "Modern Blast Cleaning and Ventilation", $4 postpaid.

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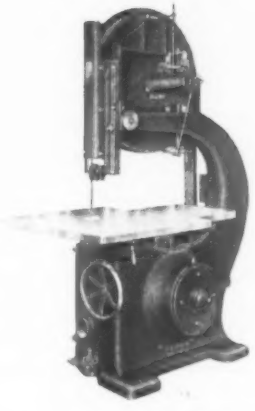
38-inch
BAND SAW

This heavy-duty, adaptable Band Saw is ideal for pattern shops. It has 38-inch wheels, and can be placed on the floor—no pit required. Does scroll sawing smoothly and rapidly. Takes 21-1/2 inches under guide, 38 inches between saw and column. Table tilts 45° to right, 5° to left. Quickly adjusted. Latest safety devices.



Ask for Bulletin 115D

COMPLETE EQUIPMENT FOR THE PATTERN SHOP

Saw Benches	Surface Planers	Wood Trimmers
Cut-Off Saws	Jointers	Oilstone Tool Grinders
Rip Saws	Shapers	Speed Lathes
Jig Saws	Milling Machines	Metal Spinning Lathes

OLIVER MACHINERY COMPANY
Grand Rapids 2, Michigan

6" Cupola Blocks and

6" Rotary Kiln Blocks

Dimensions of all Blocks

Outside Chord . . . . . 9"
Radial Dimension . . . . . 6"
Thickness . . . . . 4"

Block Number	Inside Chord in Inches	Diameter in Inches		Number of Blocks to Circle
		Inside	Outside	
30-42	6 1/16	30	42	15
36-48	6 3/4	36	48	17
42-54	7	42	54	19
48-60	7 1/16	48	60	21
54-66	7 5/16	54	66	23
60-72	7 1/2	60	72	26
66-78	7 5/8	66	78	28
72-84	7 11/16	72	84	30
78-90	7 11/16	78	90	32
84-96	7 15/16	84	96	34
90-102	7 11/16	90	102	36
96-108	8	96	108	38
102-114	8 1/16	102	114	40
108-120	8 1/16	108	120	42
114-126	8 1/16	114	126	44
120-132	8 1/16	120	132	46
123-135	8 1/16	123	135	48

Cupola blocks standard and **super quality.**
Refractory shapes, milled fire clay and cements.

THE DAVIS FIRE BRICK CO.
OAK HILL, OHIO

LESTERGRAM

TO FOUNDRYMEN WHO WANT TO GIVE THEIR CUSTOMERS A MORE COMPLETE CASTING SERVICE

LESTER-PHOENIX DIECASTING MACHINES ARE IDEAL AUXILIARIES FOR PROGRESSIVE SAND FOUNDRIES

We're soliciting business from non-ferrous foundries because—

1. Foundries get inquiries for diecastings—and
2. Occasionally lose old customers who turn to diecast parts—and
3. 190 non-ferrous foundries replied to our recent questionnaire saying,—"We're interested in diecasting equipment."

• No matter what you cast—brass, bronze, aluminum, magnesium, zinc, tin or lead—large castings or small—LESTER-PHOENIX has a stock machine for your job. And if you need to diecast several metals, your LESTER can be quickly changed to handle them.

• So if you too are thinking of offering a more complete foundry service to your trade, get acquainted with LESTER-PHOENIX machines and service now . . . Why not use our coupon today?

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Please send us the following booklets:

Steel For Diecasting Dies . . . . . ☐
Brass Diecastings (Chase) . . . . . ☐
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DIE CASTING MACHINES

Rejection Averted

BEFORE AFTER

This casting is perfectly OK internally. But it came through with shallow surface holes that belied its soundness and might easily have failed to pass inspection. With Smooth-On No. 4 Foundry Cement, the contours were trued up, and possible rejection averted.

For the past 50 years, in foundries all over America, Smooth-On has been saving good, but marred, castings from rejection. It is easy and inexpensive to use. As it hardens it expands a little and holds tight, becoming practically part of the casting metal, and may be filed or machined.

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- For light gray castings use Smooth-On No. 4AA. Fine grain, high metallic lustre. Machines perfectly. 1-, 10-, and 50-lb. sizes.
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TRIAL FREE

Entirely at our expense, you may make a conclusive test of Smooth-On on your own castings in your own plant. Just check the coupon and mail it. We'll send you also the popular 40-page, pocket-size Smooth-On Repair Handbook — over 1,000,000 copies already put in circulation.

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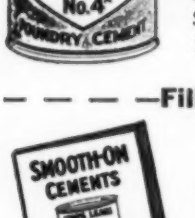

SMOOTH-ON MFG. CO., Dept. 17B,
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Please send me test samples of Smooth-On
☐ No. 4AA ☐ No. 4A ☐ No. 4B
☐ Also send Smooth-On Repair Handbook.

Name .....

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Do it with SMOOTH-ON

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Wherever there is blast cleaning there ought to be a Federal Blast Nozzle. Made of cast tungsten-carbide (the hardest metal known to man) the Federal Blast Nozzle concentrates the blast, reduces air costs and outwears any nozzle previously offered for the purpose.

Being cast, the tungsten-carbide is pure—as is not the case when made by sintering.

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10′ SQUEEZE CYLINDER

4″ JOLT CYLINDER

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Every Grain is a Complete Cutting Tool!

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1. Every grain is a complete homogeneous mass — no cleavage lines.
2. Extra hard — due to a special alloy.
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All sizes graded to new S.A.E. specifications. Order "CERTIFIED".

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Employs unusual "Grind Polish" principle with interchangeable laps, standardized polishing solutions. The "Precision" Metallurgical Hand Polisher is easy to clean, offers quiet, smooth running operations and may be flush mounted in table top or installed on top of table.

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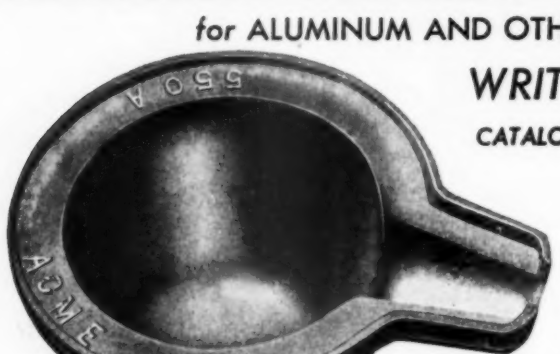
for ALUMINUM AND OTHER NONFERROUS METALS. 45 SIZES.



ROUND SPOUT POT NO. 550A
WITH 1½" COLLAR ON FLANGE

WRITE for
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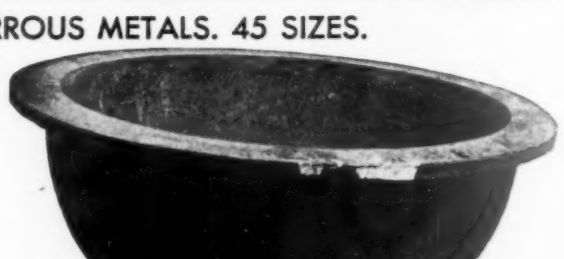

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Made of Acme SPECIAL-M-Heat Resisting Iron — They Stand the Heat!

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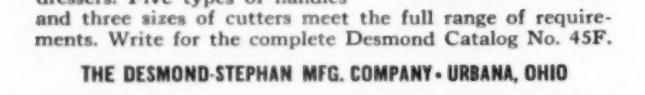
Desmond

the only complete line of grinding wheel

DRESSERS & CUTTERS



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Sand Handling, Molding and Pouring Systems
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An excellent device for producing hand made cores. Any small core box can be stripped perfectly, without any special set-up or rigging. Quikdraw Core Stripper not only produces perfect cores but completes the operation in less time than in any other way. Used by several hundred foundries. Contact us direct or your local supply house. Write for informative bulletin.

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PRODUCTION

Rugged, dependable Ohio "Extra Strength" Magnets are being used to UP production and REDUCE overhead costs in many industries. Truly versatile, they load and unload ferrous metals from trucks, freight cars and ships' holds; sweep roads clean of sharp bits of tire-destroying scrap metal; efficiently handle iron and steel in mills and factories; and extract trouble-causing metal from such materials as coal, ore, food and grain.

Ohio "Extra Strength" Magnets incorporate special design features that give *power plus* — greater dependability. It will pay you to investigate the tremendous production economies made possible by Ohio Magnets. Ohio engineers, experts in the solution of metal handling problems, are always available to give you sound engineering recommendations.

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REG. U.S. PAT. OFF.

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Where foundry operations call for metal cleaning or finishing, there is a Mall Flexible Shaft Grinder with a power rating to handle the job with speed and efficiency. 3 H. P. Geared Head—4500 r.p.m., ¾, 1, 1½ H.P. Direct Drive—3450 r.p.m. ¾ H.P. Counter-shaft models—1650 to 7400 r.p.m., are available with tilting, swiveling, dust and vaporproof or ventilated electric motors, and pedestal, low caster or overhead hanger-bail mountings.

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Camden, Ohio

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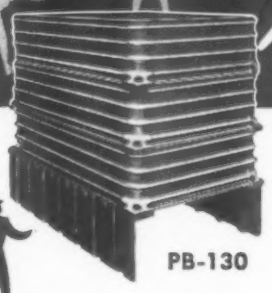

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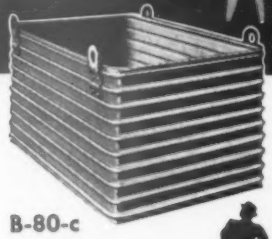

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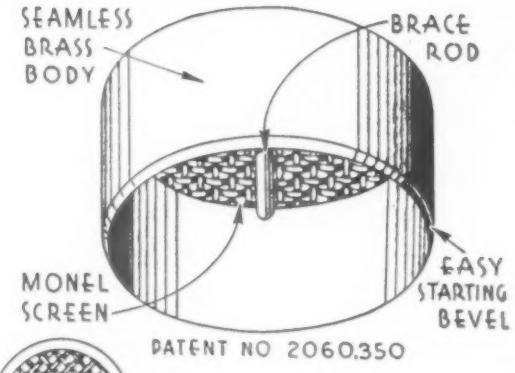

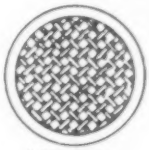

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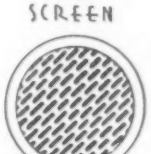

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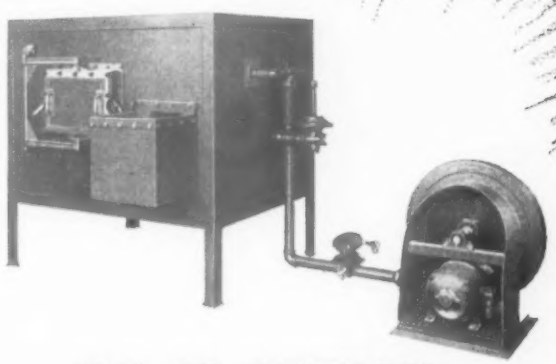

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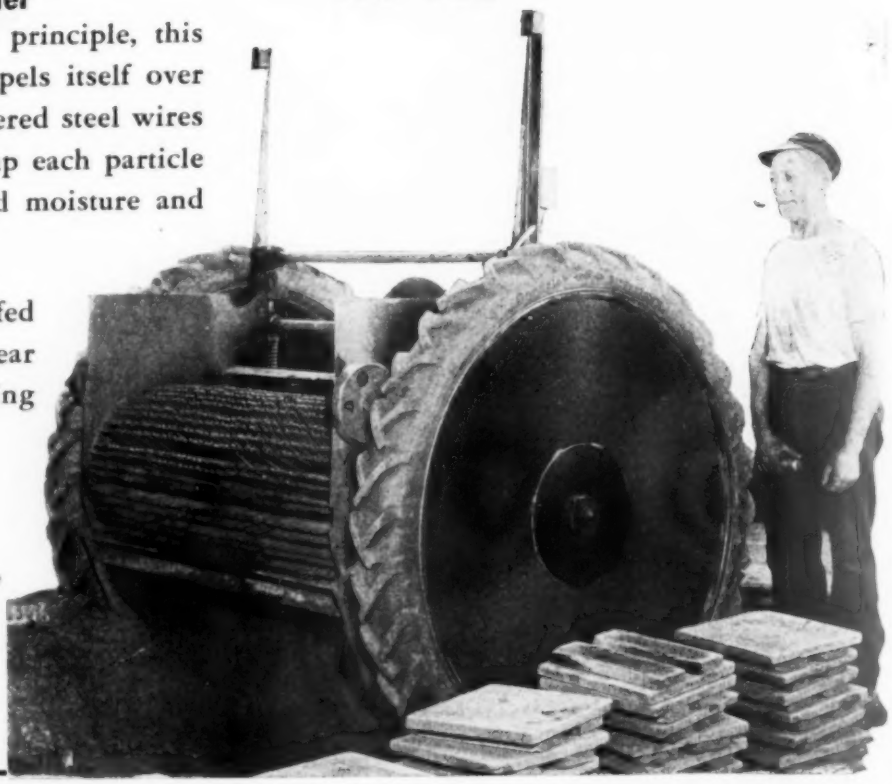

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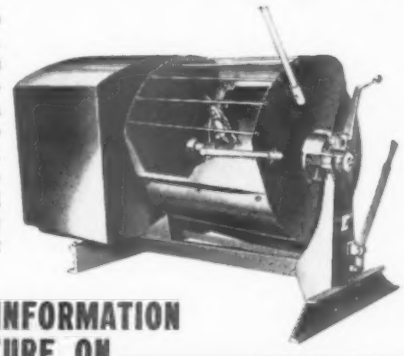

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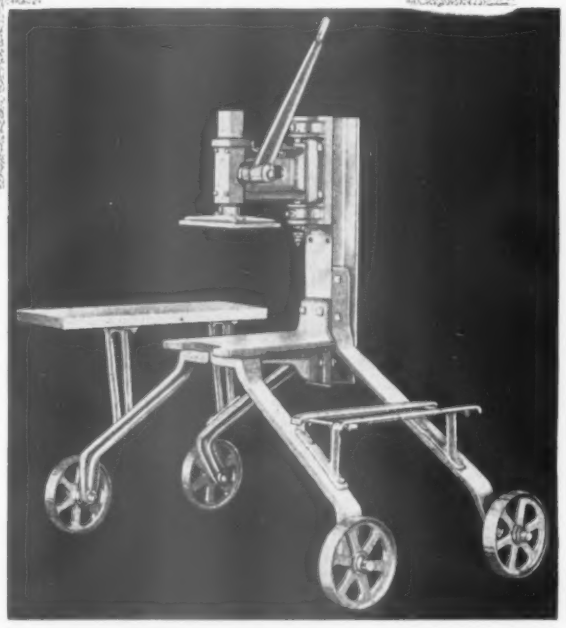

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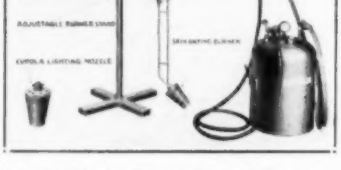

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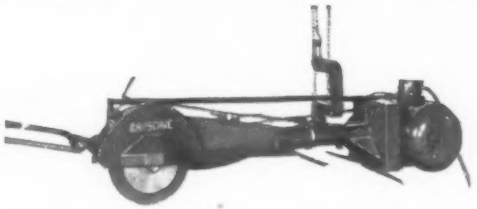

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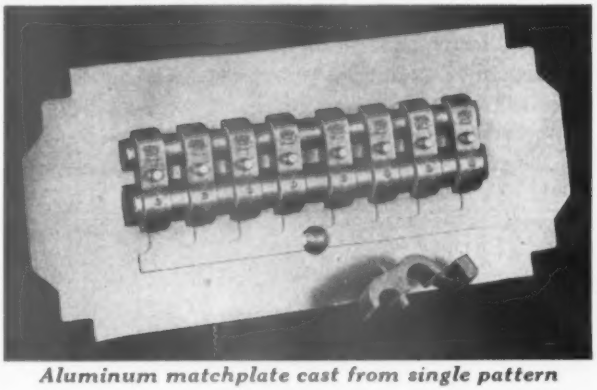

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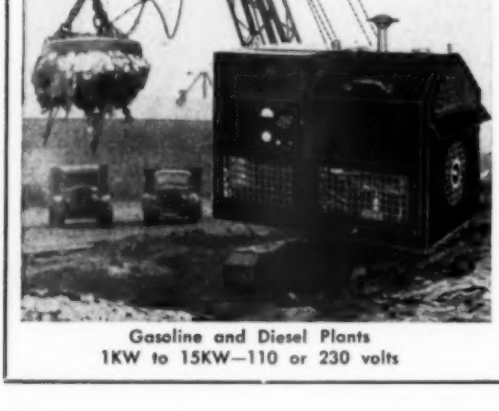

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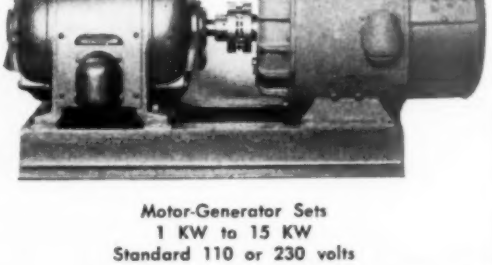

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International Molding Machine Co., 2608 W. 16th St., Chicago 8, Ill.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.

SURFACE TREATMENT METALS
N. Ransohoff, Inc., 208 W. 71st St., Cincinnati 16, O.

TAPER PINS
Standard Horse Nail Corp., New Brighton, Pa.

TEMPERATURE CONTROLLERS
Illinois Testing Laboratories, 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane Columbus 1, O.

TESTING LABORATORIES
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.

TESTING (Non Destructive)
Magnaflux Corporation, 5910 Northwest Highway, Chicago 31, Ill.

THERMOCOUPLES
Illinois Testing Laboratories, 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 1, O.
Tamms Silica Co., 228 N. LaSalle St., Chicago 1, Ill.

TIERING MACHINES (Power)
Clark Tructractor Div. of Clark Equipment Co., Battle Creek, Mich.

TIMERS (Electric)
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

TIN
American Smelting & Refining Co., 120 Broadway, New York 5, N. Y.

TONGS
Industrial Equipment Co., Minster, O.

TOOLS (Pneumatic Portable)
Chicago Pneumatic Tool Co., General Offices: 8 East 44th St., New York 17, N. Y.
Dayton Pneumatic Tool Co., Dayton 1, O.
Gardner-Denver Co., Gardner Drive, Quincy, Ill.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Joy Mfg. Co., Sullivan Division, Michigan City, Ind.
Schramm Inc., West Chester, Pa.

TORCHES and BURNERS (Acetylene, gas, oil)
Freeman Supply Co., Toledo 5, O.
North American Mfg. Co., 2910 E. 75th St., Cleveland 4, O.

TRACTORS (Gas Powered)
Clark Tructractor Div. of Clark Equipment Co., Battle Creek, Mich.

TRAMRAIL SYSTEMS
American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Modern Equipment Co., Port Washington, Wis.

TRAPS (Steam)
Johnson Corporation, Three Rivers, Mich.

TROLLEYS
Curtis Pneumatic Machinery Co., 1922 Kienlen Ave., St. Louis 20, Mo.
Modern Equipment Co., Port Washington, Wis.

TRUCKS (Electric-Industrial)
Automatic Transportation Co., 121 West 87th St., Chicago 20, Ill.
Lift Trucks Inc., 2425 Spring Grove Ave., Cincinnati 14, Ohio.

TRUCKS (Industrial)
Buda Company, Harvey, Ill.
Lift Trucks Inc., 2425 Spring Grove Ave., Cincinnati 14, Ohio.

TRUCKS (Motorized Hand Lift)
Automatic Transportation Co., 121 West 87th St., Chicago 20, Ill.

TRUCKS (Power Lift)
Automatic Transportation Co., 121 West 87th St., Chicago 20, Ill.
Clark Tructractor Div. of Clark Equipment Co., Battle Creek, Mich.
Lift Trucks Inc., 2425 Spring Grove Ave., Cincinnati 14, Ohio.

TRUCK CRANES
Hughes-Keenan Co., Mansfield, Ohio

TRUCK WHEELS
Bethlehem Steel Co., Bethlehem, Pa.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

TUBES (Annealing)
Pressed Steel Co., Wilkes-Barre, Pa.

TUMBLING BARRELS
Cleveland Chaplet & Mfg. Co., 1197 West 67th St., Cleveland 2, O.
Haynes Foundry Equipment Co., 814 Ada St., Kalamazoo 21, Mich.
N. Ransohoff Inc., 208 W. 71st St., Cincinnati 16, O.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

TURNTABLES
Beardsley & Piper Co., The 2424 No. Cicero, Chicago 39, Ill.
Modern Equipment Co., Port Washington, Wis.
Roto-Cast Foundry Equipment Inc., 100 Grand St., Coldwater, Mich.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

UNIT HEATERS
Dravo Corp., Neville Island, Pittsburgh 25, Pa.

VACUUM CLEANERS (Industrial)
Breuer Electric Mfg. Co., 5100 N. Ravenswood Ave., Chicago 40, Ill.

VACUUM CLEANERS (Portable, stationary)
U. S. Hoffman Machinery Corp., 105 4th Ave., New York 17, N. Y.

VALVES (Air, Water, Steam)
Air-Way Pump & Equipment Co., 405 S. Jefferson St., Chicago 7, Ill.
Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.
North American Mfg. Co., 2910 E. 75th St., Cleveland 4, O.
R-S Products Corp., 4530 Germantown Ave., Philadelphia 44, Pa.

VALVES (Adjustable Orifice)
North American Mfg. Co., 2910 E. 75th St., Cleveland 4, O.

VALVES (Blow-off and Cut-off)
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.
Wm. H. Nichols Co., Richmond Hill, Long Island 18, N. Y.

VENTILATING SYSTEMS
American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Joy Mfg. Co., La-Del Division, New Philadelphia, Ohio.
Pangborn Corp., Hagerstown, Md.
Schneible Co., Claude B., 2827—25th St., Detroit 16, Mich.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, O.
Sturtevant Co., B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston, Mass.

VENTS (Core Box)
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Demmler & Bros., Wm., Kewanee, Ill.
Reinacker Industries, 2035 Hilton Rd., Ferndale, Mich.
Sinel Co., 1405 Philadelphia Drive, Dayton 6, O.
C. M. Smillie & Co., 1100 Woodward Hgts. Blvd., Ferndale, Mich.

VIBRATORS
Adams Co., Dubuque, Iowa.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Cannon Vibrator Co., 111 Power Ave., Cleveland 14, Ohio.
Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.
Davenport Machine & Foundry Co., Davenport, Iowa.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.
Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, O.
Link Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Martin Engineering Co., Kewanee, Ill.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.
New Haven Vibrator Co., 131 Chestnut St., New Haven 7, Conn.
Nichols Co., Wm. H., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
S P O Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Syntron Company, Homer City, Pa.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

VIBRATORS (Core Bench)
Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.

VISES (Air Operated)
Van Products Co., Erie, Pa.

WARM AIR HEATERS
Dravo Corp., Neville Island, Pittsburgh 25, Pa.

WASH ROOM EQUIPMENT
Bradley Washfountain Co., Box 732, Milwaukee 1, Wis. Milwaukee, Wis.

WAX (Core, Vent, Pattern)
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, Ohio.
PMS Co., 1701 Power Ave., Cleveland 14, O.
United Compound Co., Inc., 328 South Park Ave., Buffalo 4, N. Y.

WEDGES (Foundry)
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

WELDING GAS
Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.

WELDING APPARATUS (Electric Arc)
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Metallizing Company of America, 1330 W. Congress St., Chicago 7, Ill.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

WELDING and CUTTING APPARATUS and SUPPLIES
Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.

WELDING ELECTRODES (Carbon)
National Carbon Co., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.

WELDING RODS & ELECTRODES
Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.
Metallizing Company of America, 1330 W. Congress St., Chicago 7, Ill.

WHEELBARROWS
Construction Machinery Corp., Waterloo, Iowa.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

WHEELS, ABRASIVE (Cut-off)
Bay State Abrasive Products Co., Westboro, Mass.
Bridgeport Safety Emery Wheel Co. Inc., Bridgeport, Conn.
Carborundum Co., Perth Amboy, N. J.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
General Grinding Wheel Corp., West Abrasives, Inc., Philadelphia 34, Pa.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Keystone Abrasive Wheel Co., Carnegie, Pa.
Raybestos Manhattan, Inc., Manhattan Rubber Division, Passaic, N. J.
Mid West Abrasive Co., Detroit, Mich.
Norton Company, Worcester 6, Mass.
Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit, Mich.
Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.
Sterling Grinding Wheel Division, Cleveland Quarries Co., Tiffin, Ohio.

WHEELS (Wire)
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

WIRE BRUSHES
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

WIRE NAILS
Bethlehem Steel Co., Bethlehem, Pa.
Republic Steel Corp., Cleveland 4, O.

WOODWORKING MACHINERY
Delta Mfg. Co., 620 E. Vienna Ave., Milwaukee 1, Wis.
Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, Ohio.
Oliver Machinery Co., Grand Rapids 2, Mich.

X-RAY EQUIPMENT
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

X-RAY FILMS
Eastman Kodak Co., Rochester, N. Y.

X-RAY INSPECTION
Magnaflux Corporation, 5910 Northwest Highway, Chicago 41, Ill.

ZINC
American Smelting & Refining Co., 120 Broadway, New York 5, N. Y.

—When writing advertisers, please mention THE FOUNDRY—

Classified Advertising

Help Wanted

FOUNDRY SUPERINTENDENT OR MANAGER

For medium size gray iron foundry in Eastern New York State, making small squeezer work, production machine moulding of small to medium castings and heavy machinery castings up to 3 or 4 tons. Now melting about 7 tons daily but want to double present production. The right man must be good general all round foundry man capable of producing quality and at competitive production rate on economical basis. Prefer young to medium age but ability is determining factor. Excellent opportunity for one who can produce results. If you are confident you can qualify write full particulars, including salary expected, and including references, otherwise, don't write. ADDRESS: BOX 182, THE FOUNDRY, CLEVELAND 13, OHIO.

MANUFACTURER'S AGENT

For southern and western Ohio now contacting foundries to represent nationally known line of electric melting furnaces for iron and bronze foundries. Write giving details on territory now covered, qualifications, companies represented, references, etc. Indiana territory also open. Address: Box 112, The FOUNDRY, Cleveland 13, Ohio.

PATTERN MAKER FOREMAN

By foundry manufacturing small brass castings of plumbers' fixture fittings and trim. Must have experience in wood and metal pattern making layout and general supervision. Good chance for advancement with a growing concern. Write stating experience, approximate wages expected and other particulars. Address: Box 173, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

Experienced squeezer foreman having good knowledge of squeezer department work. Must know gating and risering of patterns for gray iron castings production shop. State age, experience, references and salary requirements. Address: Box 137, The FOUNDRY, Cleveland 13, Ohio.

PATTERN FOREMAN

Experienced wood and metal pattern maker for position as foreman in department employing approximately twenty men. Must be capable of assuming full responsibility for pattern storage along with pattern making, rigging and repairs. Unless you can assume this complete responsibility do not answer. State complete references and experience in first letter. Address: Box 181, The FOUNDRY, Cleveland 13, Ohio.

MANAGER OF MANUFACTURING

Well established manufacturer of gray iron castings with normal employment of 500 requires an executive foundryman with ability to take complete charge of manufacturing operations. Company produces quality castings for farm, automotive, machinery and miscellaneous manufacturers on semi-production basis. Write in detail education, experience, type of product manufactured and references. Address: Box 205, The FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT

For long established foundry about to be mechanized to produce 65—70 tons daily of grey iron and semi-steel light, medium and heavy castings on jolt squeeze, rollover, bench, floor and pit. Desire man with technical training, experienced in all foundry departments, who can build and maintain a good organization and consistently produce good castings economically. Pennsylvania location. Address: Box 138, The FOUNDRY, Cleveland 13, Ohio.

WORKS MANAGER OR GENERAL FOUNDRY SUPERINTENDENT

For highest quality electric steel foundry producing small steel castings. Please state qualifications. Address: Box 123, The FOUNDRY, Cleveland 13, Ohio.

EXPERIENCED CUPOLA MAN

Familiar with Kathabar Process in the manufacture of individual grey iron castings. Splendid opportunity with nationally known concern in Philadelphia area. Address: Box 983, The FOUNDRY, Cleveland 13, Ohio.

MANUFACTURER'S AGENT

To represent Eastern permanent mold foundry in the following territories: New England, New York State, Pennsylvania, Maryland and Delaware. Address: Box 187, The FOUNDRY, Cleveland 13, Ohio.

Help Wanted

FOUNDRY FOREMAN

Kentucky foundry requires foreman; middle-age preferred. Must be able to handle men, direct operations of cupola, squeezer machines, core making and floor molding on grey iron castings 1# to 20 tons and know how to mix iron by analysis. Address detailed reply, stating age, education, experience, references and salary desired.

BOX 163

THE FOUNDRY CLEVELAND 13, OHIO

CHIEF INDUSTRIAL ENGINEER

$6,000 to $7,200.

Prefer man who has worked in a foundry, then become an industrial engineer. Position is to take full charge of industry engineering in medium sized plant. Rush.

LEONARD EXECUTIVE PERSONNEL
CLUB FLOOR
HOTEL WILLIAM PENN
PITTSBURGH 19, PA.

PERMANENT MOLD SUPERVISOR

To assist supervisor of Casting Department, leading to charge of shift.

Should be experienced in conditioning, maintenance and operation of permanent molds for maximum quality.

Knowledge of melting, inspection control and handling of men essential. State experience in detail, also age, education and salary desired.

Location Middle West. Progressive growing concern.

BOX 156

THE FOUNDRY CLEVELAND 13, OHIO

WANTED

By an old established pattern shop in Brooklyn, N. Y. man with pattern making and foundry experience to run match plate business. Must be able to train new employees and take over complete operation of plant. Excellent opportunity. State experience and references. Address: Box 161, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY TECHNOLOGIST

Required with practical experience in the manufacture of high quality gray iron castings. Some traveling necessary. Give full particulars. Address: Box 197, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY ENGINEER

With metallurgical background and practical foundry experience. Must be prepared to travel. Give age and training and experience. Address: Box 196, The FOUNDRY, Cleveland 13, Ohio.

Help Wanted

MALLEABLE IRON FOUNDRYMAN

LONG ESTABLISHED MALLEABLE IRON JOBBING FOUNDRY MAKING MEDIUM WORK HAS OPENING FOR EXPERIENCED MAN FAMILIAR WITH ALL OPERATIONS AND PARTICULARLY CUPOLA AND AIR FURNACE MELTING, MOLDING AND COREMAKING. SHOULD KNOW MODERN FOUNDRY EQUIPMENT AND AN ENGINEERING BACKGROUND IS DESIRABLE. A PERMANENT JOB WITH EXCELLENT PROSPECTS FOR THE RIGHT MAN WHO CAN SHOW A SUCCESSFUL RECORD AND IS AMBITIOUS. NO FLOATERS, PLEASE. ADDRESS BOX 109, THE FOUNDRY, CLEVELAND 13, OHIO.

SALES ENGINEER

Must have thorough experience on application of modern dust elimination equipment to foundry dust and ventilation problems. Submit information as to educational background, age, experience and salary desired.

BOX 125

THE FOUNDRY CLEVELAND 13, OHIO

YOUNG METALLURGIST

Good opportunity with Ohio manufacturer for young metallurgist in brass foundry. Give education, experience and salary expected. Address: Box 965, The FOUNDRY, Cleveland 13, Ohio.

BRASS OPEN HEARTH OPERATOR

Secondary nonferrous refiners. Midwestern Region. State experience, qualifications, references and wages desired in first letter. Address: Box 866, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Man to take charge of Aluminum Permanent Mold Casting plant. Must know how to make permanent mold castings. State salary. Address: Box 176, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

Grey iron foundry located in town of 6500 in Central Iowa needs foreman to take charge of 25 squeezers, some rollover and floor work. Good opportunity for the right man. Send names of references, past experience and salary expected with first letter. Address: Box 167, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

For a nonferrous foundry manufacturing small castings. Excellent living conditions, good wages and chance for advancement. Growing concern. Address: Box 945, The FOUNDRY, Cleveland 13, Ohio.

BRONZE FOUNDRY FOREMAN

A working foreman in a well equipped bronze foundry. Excellent opportunity. State age, experience and salary desired. Address: Box 184, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Must be thoroughly experienced on gray iron and bronze. Opportunity to share in profits. Middle West. Address: Box. 194, The FOUNDRY, Cleveland 13, Ohio.

BRASS FOUNDRY FOREMAN

A working foreman to assist Foundry Superintendent in a well equipped production brass foundry; good opportunity for a hustler. State age, experience and salary desired in first letter. Address: Box 192, The FOUNDRY, Cleveland 13, Ohio.

MELTING SUPERINTENDENT

For small mechanized alloy iron foundry producing the highest quality specialized product. Must have thorough knowledge of modern cupola and electric furnace practice. Located in Michigan. Address: Box 180, The FOUNDRY, Cleveland 13, Ohio.

GRAY IRON SUPERINTENDENT

Experienced gray iron superintendent, capable of taking complete charge of operations in modern, mechanized foundry. State full qualifications and salary expected in first letter. Excellent opportunity for aggressive, high grade man. Address: Box 133, The FOUNDRY, Cleveland 13, Ohio.

SALESMAN

For foundry supplies. Territory Illinois, Iowa and Nebraska. Prefer someone with foundry experience. Must be under 50 years of age. Address: Box 195, The FOUNDRY, Cleveland 13, Ohio.

Classified Advertising

Help Wanted

ALUMINUM OPEN HEARTH OPERATOR

Secondary nonferrous refiners. Midwestern Region. State experience, qualifications, references and wages desired in first letter. Address: Box 867, The FOUNDRY, Cleveland 13, Ohio.

BRASS FOUNDRY FOREMAN

Practical foundryman to take complete charge of foundry and core room. Brass and aluminum. Preferably some experience in plumbing line. In your application state age, experience, references and salary desired in first letter. Address: Box 119, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

For plumbing fixture foundry, using 2 Beardsley Slingers. In Pennsylvania, good opportunity. Give full particulars. Address Box 916, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

General foundry foreman for malleable castings. Foundry located in Eastern area. Address: Box 168, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN WANTED

Experienced on cupola and squeezer molding practice to help establish and supervise a new small gray iron foundry. Prefer a man with some capital desirous of being part owner. Location—central New York. Replies confidential. Address: Box 179, The FOUNDRY, Cleveland 13, Ohio.

GENERAL SUPERINTENDENT

Nonferrous large up-to-date New York City foundry desires general superintendent. Must be experienced both technically and as a foundry executive. Must be experienced in all types of aluminum and bronze foundry work and capable of getting high production and quality from melting pot to finished casting. This is a well paying job for the right man. Write complete history and details. Address: Box 200, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

PATTERNMAKER FOREMAN

Metal and wood patternmaking, general line pattern work from molding machine cope and drag plates, core equipment and the general line of machine tool patterns with jig and fixture patterns. Estimate layout work, supervise making and checking patterns. First class mechanic, can take over working foreman job in small shop, teach apprentices and handle journeymen to show profit on work in your shop. Take over matchplate work including hard hand matchplates and plaster cast pressure plates or patterns. General experience both patternshop and foundry on pattern equipment. Address: Box 142, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Practical iron foundryman. Technically trained. Has broad working knowledge of all foundry activities in production and jobbing foundries. Experienced in mold conveying, sand preparation and distribution. Had charge of foundries producing up to 125 tons daily. Good record handling union labor. East or New England preferred. Address: Box 188, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Practical foundryman with thirty years of thorough knowledge of all phases of grey iron foundry activities in production and jobbing foundries. Good record handling union labor. Past eleven years as foreman and superintendent. Address: Box 995, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Practical molder and core maker on all classes of work. Understand cupola operation thoroughly and read blue prints. Have technical training. At present employed. Married. Address: Box 198, The FOUNDRY, Cleveland 13, Ohio.

SALES REPRESENTATIVE

With good following and contacts. Ferrous and nonferrous — sand — permanent and centrifugal castings. Michigan and Ohio. Address: Box 153, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

NONFERROUS FOUNDRY MANAGER OR SUPERINTENDENT

McLain Graduate of Milwaukee, Wis. Practical foundryman with many years' experience in aluminum, brass, copper bronze, aluminum bronze and magnesium bronze in jobbing or production in mechanized foundry setup. Understand foundry molding coreroom cutoff grinding and cleaning room and shipping room. A-1 foundryman in marine hardware and plumbing fixtures. Neat appearing and aggressive. Employed as foundry superintendent and engineer. Address: Box 974, The FOUNDRY, Cleveland 13, Ohio.

GRAY IRON FOUNDRYMAN

Practical foundryman, technically trained with unusual background experience and knowledge in modern scientific foundry control and methods wants new connection as assistant to fussy executive or where experience, knowledge and skill will prove of mutual advantage to both parties. Worth investigating. Address: Box 186, The FOUNDRY, Cleveland 13, Ohio.

AVAILABLE

Foundryman with 32 years' experience; practical in all branches gray iron and nonferrous and pattern work. Twenty-eight years in supervisory capacity. Fourteen years' foreign service including one year in Far East for U. S. Government. Presently employed in Central America. Will go anywhere but prefer Latin America. Best of references. Address: Box 177, The FOUNDRY, Cleveland 13, Ohio.

PURCHASING AGENT

Eighteen years' experience steel and other metals, forgings, castings, shop equipment and supplies, machinery, etc., office routine and management. Address: Box 157, The FOUNDRY, Cleveland 13, Ohio.

PERMANENT MOLD FOUNDRYMAN

Graduate engineer experienced in all phases of aluminum permanent mold work seeks connection with progressive foundry interested in establishing a permanent mold operation. Consider also proposition from party with modest capital and sales connections interested in entering low price casting field. Address: Box 190, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT OR MANAGER

Capable, progressive gray iron foundryman with successful record as Foundry Superintendent, qualified to direct all foundry activities. Twenty-eight years' practical experience and technical knowledge, specializing in jobbing production of heavy machinery and diesel engine castings with proven ability developing and applying modern methods and scientific controls over all operations. Address: Box 126, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT OR MANAGER

A single young man that has held the above position. Has practical experience in molding, core making, laboratory control and continuous cupola operation. Malleable, grey iron and magnesium background. Address: Box 160, The FOUNDRY, Cleveland 13, Ohio.

GENERAL MANAGER

With long valuable experience in managing, building up and maintaining foundry and machinery business on profitable basis, invites correspondence preliminary to interview. Ability to direct all office, sales, financial and production activities efficiently and economically unquestionably established by previous record. Address: Box 441, The FOUNDRY, Cleveland 13, Ohio.

DEMONSTRATOR OR SERVICE MAN AVAILABLE

High grade man desires to make a connection. Thirty years of foundry experience, technical background can help your sales of any type foundry material or equipment. Address: Box 143, The FOUNDRY, Cleveland 13, Ohio.

CORE ROOM SUPERINTENDENT OR ASSISTANT TO PLANT SUPERINTENDENT

Have the experience and qualifications for both. Twenty-five years' experience in charge of core rooms, production and jobbing. Can rig and operate all core room machinery. Specialized on sand control. Experienced on automotive castings, gas or diesel blocks and heads. Address: Box 171, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

NONFERROUS FOUNDRY SUPERINTENDENT OR FOREMAN

Practical experience on high grade work including Chandelier castings, grave markers, ornamental bronze, hardware, steam valves, jobbing and production work. Prefer position in or near Chicago or East of Chicago. Salary $7500 a year. Address: Box 178, The FOUNDRY, Cleveland 13, Ohio.

METALLURGIST

If you are looking for a high grade metallurgist with 20 years' experience in the grey iron, cast steel and malleable iron foundry business, one who understands mass production and quality control and can produce the goods, then I am your man. Am interested in locating on the Pacific Coast or in the Middle West. Address: Box 172, The FOUNDRY, Cleveland 13, Ohio.

GRAY IRON FOUNDRY EXECUTIVE

Technical education in metallurgy and business administration with an unusual practical background in all classes of light ond medium castings. Experienced in developing stable organizations for improved operations. Qualified record in maintaining excellent employee and customer relations. Address: Box 990, The FOUNDRY, Cleveland 13, Ohio.

EASTERN SALES REPRESENTATIVE FOUNDRY PRODUCTS

Technical graduate with approximately ten years foundry experience, all departments, molding, foundry methods, castings design, costs details, pattern design, gating, sales engineering, customer contacts, correspondence, research. Ferrous or nonferrous foundry making types of castings or diversified lines. Full time available if unusual opportunity. Address: Box 146, The FOUNDRY, Cleveland 13, Ohio.

METALLURGICAL ENGINEER

Age 34. Eight years' experience in iron and steel foundry process development work. Presently employed as development engineer. Desires position as service engineer with progressive iron or steel foundry. Midwestern location preferred. Address: Box 162, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY METALLURGIST

Sound experience. Raw materials, cupola, electric, open hearth operation, laboratory supervision. Steel, alloys, iron, nonferrous. Age 39. M.S. Address: Box 199, The FOUNDRY, Cleveland 13, Ohio.

MELTER

With 20 years' experience on acid, basic and electric furnaces. Understand making of all alloy steel handling of ladles. Willing to go any place. Address: Box 962, The FOUNDRY, Cleveland 13, Ohio.

YOUNG METALLURGICAL ENGINEER

Mechanical engineering degree with metallurgical experience—two years well ground experience in steel and cast iron metallurgy before entering Navy—at present shift foreman in nonferrous smelter—either ferrous or nonferrous position acceptable. Address: Box 135, The FOUNDRY, Cleveland 13, Ohio.

PRODUCTION MANAGER

Successful practical planner, 25 years' experience including sales, machine shop and foundry. Address: Box 111, The FOUNDRY, Cleveland 13, Ohio.

AVAILABLE

Foundry and industrial engineer, for modernization, mechanization, surveys, wage incentives, production controls, cost control in grey iron, malleable and steel, on consulting or short term contract basis. Address: Box 813, The FOUNDRY, Cleveland 13, Ohio.

ASSISTANT SUPERINTENDENT NONFERROUS METALLURGIST

B. S. in metallurgical engineering. Three years' experience in foundry research involving foundry alloys, melting, gating, casting and testing. Desire position in development or production capacity. Address: Box 904, The FOUNDRY, Cleveland 13, Ohio.

YOUNG FOUNDRY EXECUTIVE

A practically trained foundryman, well versed in all phases of production and jobbing work, steel and high alloy. Thirteen years' experience with both small and large castings. Presently employed by Midwest Manufacturer but desires a more progressive employer. Engineering graduate, capable of handling any foundry assignment. Address: Box 147, The FOUNDRY, Cleveland 13, Ohio.

Classified Advertising

Engineering Service

Is your percentage of scrap too high? We do not sell any product for making better castings; all we offer is the benefit of thirty years of FOUNDRY EXPERIENCE in all types of metal. We start where the Industrial Engineer stops. We get the "BUGS" out. Trouble shooting and plant layout our specialty. Let us diagnose your casting problems. We guarantee to improve conditions.
NO JOB TOO LARGE . . NO JOB TOO SMALL
BETTER CASTINGS BUREAU
P.O. BOX 259
MONTGOMERY, ILL.

Castings Wanted

GRAY IRON CASTINGS WANTED

Large quantities soil fittings, average weight 50 pounds each; green sand cast iron. Our own patterns available. Send for blueprints.

STANDARD FABRICATIONS, INC.
721 NORTH MICHIGAN AVE.
CHICAGO 11, ILL.

Capacity Wanted

ALUMINUM CASTINGS

Foundry to make small aluminum castings. Steady year round work. Pressure match plates furnished. Address: STANLEY TOY CO., OCONTO, WIS.

Open Capacity

OPEN CAPACITY

Gray iron production foundry located in Central Iowa has open capacity for squeezer work. Iron made to your analysis. Can furnish up to 15 tons per day. Address: Box 170, The FOUNDRY, Cleveland 13, Ohio.

OPEN CAPACITY

New permanent mold developed for making four inch soil pipe fittings. Nothing too difficult to design from frying pans to engines, including sinks and tubs.

WAGNER PERMANENT MOLD CO.
2910 EMPIRE AVE., BURBANK, CALIF.

OPEN CAPACITY

Pattern shop near Cleveland has open time on small and medium patterns, wood and metal matchplates or complete equipment on metal work. Also on jig and fixture patterns. Good delivery on first class patterns. Address: Box 203, The FOUNDRY, Cleveland 13, Ohio.

Opportunities

OPPORTUNITIES

Will lease, to experienced reliable operator, complete gray iron and nonferrous foundry in middle west. Building and equipment practically new. Address: Box 193, The FOUNDRY, Cleveland 13, Ohio.

OPPORTUNITIES

Have new modern production gray iron foundry, capable of making 25 tons of castings per day. Located in Central Iowa. Will sell all or part interest to company capable of taking substantial part of production. Company showed profit of approximate $100,000.00 in 1945. Address: Box 169, The FOUNDRY, Cleveland 13, Ohio.

OPPORTUNITY

We can furnish empty tight and slack wooden barrels also steel drums for your products. ADDRESS: BUCKEYE COOPERAGE STATION, C.P.O. BOX 1501, CLEVELAND, OHIO.

Accounts Wanted

GRAY IRON ACCOUNT WANTED

Well known Cleveland sales representative wants to acquire gray iron casting account. Only the best considered. Address: Box 166, The FOUNDRY, Cleveland 13, Ohio.

Accounts Wanted

MANUFACTURERS' REPRESENTATIVE

Will open office in Buffalo, New York. Desires to contact manufacturer desiring representation in this territory. Particularly interested in product for foundry, heavy duty and automotive industries. Well acquainted and familiar with these industries. Request interview for arrangements. Address: Box 183, The FOUNDRY, Cleveland 13, Ohio.

FACTORY REPRESENTATIVE

For a manufacturer of nonferrous and gray iron furnaces covering Northwestern states desires to obtain lines of foundry equipment suitable to go with same. Address: Box 114, The FOUNDRY, Cleveland 13, Ohio.

Employment Service

SALARIED POSITIONS
$2,500-$25,000

This thoroughly organized confidential service of 37 years' recognized standing and reputation carries on preliminary negotiations for supervisory, technical and executive positions of the calibre indicated. Retaining fee protected by refund provision. Identity covered and present position protected. Send only name and address for details.

R. W. BIXBY, INC.
101 Dun Bldg. Buffalo 2, N. Y.

SALARIED PERSONNEL

$3,000—$25,000. This reliable service, established 1927, conducts confidential negotiations for high-grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, DEPT. T, 109 CHURCH STREET, NEW HAVEN, CONN.

Wanted-To-Buy

WANTED

Late model American Foundry Equipment sand cutter. State age, condition, spare parts, electrical current of motors.
2—International 20" x 8" draw type R. Hand ramming, hand turnover, hand draw machine with one set of Aluminum levelers. ..... $125.00 each.
Forward information to:

MARCH BROWNBACK CO., INC.
POTTSTOWN, PA.

WANTED

A small producing ferrous foundry in Ohio, Pennsylvania, West Virginia, Maryland or Virginia. Must be well equipped and preferably with small electric furnace though not necessary. Cash available and required for immediate operation. Address: Box 145, The FOUNDRY, Cleveland 13, Ohio.

WANTED

2000 or 3000# coal charge Detroit rocker type electric furnace with transformer and controls complete.

THE DAYTON STEEL FOUNDRY COMPANY
P. O. BOX 1022
DAYTON 1, OHIO
PHONE: ADAM 3238

WANTED

Two (2) American Wheelabrator Equipment Company wheelabrator tumblasts size 42 x 48 or 48 x 48. Address: Box 175, The FOUNDRY, Cleveland 13, Ohio.

TUMBLING BARREL

Used tumbling barrel approximately 36" x 66" complete with lining, gear reduction drive and 220 volt motor. Address: LEHIGH FOUNDRIES, INC., EASTON, PA.

WANTED

One—403 Osborn jolt rollover machine or one 403-W Osborn jolt rollover machine. Address: Box 174, The FOUNDRY, Cleveland 13, Ohio.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address Box 578, The FOUNDRY, Cleveland 13, Ohio.

Foundries For Sale

FOR SALE

FOUNDRY—Well equipped and situated in progressive agricultural community. Includes building, land, business and a large number of standing orders for castings from manufacturers of agricultural equipment. $12,500 total price. $7,400 down, terms on balance. Address: Box 996, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOR SALE

Aluminum permanent mold foundry, producing building specialties; national distribution. $200,000 a year business. Owner must sell at once, no reasonable offer will be refused. Address: FLORIDA DIE CASTING FOUNDRY, P.O. BOX 1589, ORLANDO, FLA., PHONE 2-1838.

FOR SALE

Substantial interest in small, well established, well equipped alloy steel foundry. $15,000 will suffice. Address: Box 189, The FOUNDRY, Cleveland 13, Ohio.

Correspondence Course

GOOD FOUNDRYMEN ARE NOT AN ACCIDENT—THEY DO NOT MERELY HAPPEN

Foundrymen who will add the concisely arranged information on mixing, melting, and semi-steel to their store of experience will prove a valuable asset to any firm. Even though you know 90% of what we offer, the remaining 10% may be causing your firm large losses. Our report on your melting may be worth the fee alone. Remember, semi-steel is the purest, hottest and strongest metal made in the cupola. Synopsis free.

MCLAIN'S SYSTEM INC.
236 E. NORTH AVE.
MILWAUKEE 12, WIS.

For Sale

FOR SALE

Pangborn table blast type L D.I.-PC500 8 ft. table good condition $1200.00.

2—Nichols jolt, strip, squeeze machine stationary high production. Will handle up to 15 x 30 flask #1800 size 16-40 type D draw 4 x 7 $485.00 each.

UNITED CASTINGS CO.
CLARKSTON, MICH.
Phone—Clarkston 5431

FOR SALE

Brinell Machine
Steel City serial 3015. Type A-4—clearance between uprights 3'-8" max. Height of work 4'-3". Motor operated. Wired for 220-3-60. Complete. In very good condition. Used very little.

Hi-Cycle Grinders and MG Set
Lot of 21 high frequency grinders of Chicago Pneumatic and Rotor Tool make. Wired for 110-3-180. 6 brand new, 4 factory rebuilt, 8 used. 3 with gearhead missing. Speed varies from 3075 to 8600 rpm.

Motor generator complete, wired for 220-3-60. Set in good condition.

Shakeout Machine
Simplicity Model B complete with V-belt drive, motor and starter. In good condition. Motor wired for 220-3-60.

LEBANON STEEL FOUNDRY,
LEBANON, PA.

FOR SALE

Ransohoff wet mill 30" x 32", serial #1394, with 3hp motor and reversing switch—good condition $450.00. Address: ELKHART BRASS MFG. CO., ELKHART, IND.

FOR SALE

One 27" by 36" American Foundry Equipment Wheelabrator complete with motors and loading skip including miscellaneous spare parts. 220V—3 ph. 60 cycles. About 5 years old. Excellent condition.
One W. W. Sly Tumbling Mill. Belt driven. 30" by 48". Good condition.
One Nicholls #11-32 Heavy duty combination jolt and power squeezer molding machine with pattern draw Ser. No. 41022. Like new.

WELLS MANUFACTURING COMPANY
1856 MINER STREET
DES PLAINES, ILLINOIS

Classified Advertising

For Sale

OVERHEAD CRANES

1-TON
Shepard 12' Span
Detroit 38' Span

2-TON
Conco 27' 6¾" Span
Louden 19'2" Span
Shaw 16'3" Span
Conco 12' Span

3-TON
Shaw 33' Span

5-TON
P&H 44'6" Span
Shaw 47'4" Span
Whiting 47'4" Span
Champion 37'6" Span
P&H 40' Span
Northern 30' Span
Detroit 38'8" Span
Robbins & Meyer 32' Span
P&H 80' Span
Milwaukee 85' Span

6-TON
Northern 46' Span

7½-TON
Northern 26'7½" Span

10-TON
Alliance 58'9" Span

Shepard Niles 27'7½" Span
Morgan 55'6" Span
Shepard Niles 40' Span
Whiting 37' Span
Toledo 77' Span
2 Yd. Morgan Bucket Crane 60' Span
Shaw 80'9" Span
Ederer 70' Span
Case 80' Span
American 27' Span
P&H 87'6" Span
Niles 75'1½" Span
Alliance 100' Span

12½-TON
Niles 75'1" Span

15-TON
Euclid 84'3" Span
Morgan 73'5½" Span
P&H 32' Span
P&H 52' Span
Morgan 82' Span
Whiting 71'10½" Span
Bedford 34'6" Span

20-TON
Morgan 62' Span

25-TON
Bedford 27'3" Span

Bedford 67'8" Span
Shaw 58' Span
Tysaman 60' Span
Shaw 60' Span

30-TON
Ederer 60' Span
Ederer 40' Span
Ederer 76' Span
Niles 57'6" Span
Northern 75' Span

35-TON
Northern 22' Span

40-TON
Shepard Niles 49' Span

50-TON
Cleveland 71'10½" Span
Morgan 60' Span
P&H 32' Span
P&H 40' Span
Shaw 40' Span
Shaw 95' Span

75-TON
Alliance 37' Span
Alliance 78' Span

150-TON
Whiting 30' Span

200-TON
Alliance 100' Span

TELEPHONE US COLLECT TO DISCUSS YOUR REQUIREMENTS.

ECONOMY COMPANY, INC.
49 VANDERBILT AVENUE, NEW YORK 17, N. Y.
TELEPHONE: MURRAY HILL 4-1616

CUPOLA BLOWERS FOR SALE

33 C.F. Connersville 4 Bearing Rotary Positive Blower, 60" barrel length, 20" dia. outlet & intake. Arr. for m.d.

16.2 C.F. Connersville 6 Bearing Rotary Positive Blower, 27" barrel length, 12" dia. outlet & intake. Arr. for m.d.

14.2 C.F. Connersville 4 Bearing Rotary Positive Blower, 30" barrel length, 12" dia. outlet & intake. Arr. for m.d.

Also centrifugal blowers.

Complete list on request.

INDUSTRIAL PLANTS CORPORATION
316 S. LASALLE ST.
CHICAGO 4, ILLINOIS

FOR SALE

1—Coleman junior rolling drawer core oven, completely equipped for gas firing.

OLD COLONY FOUNDRY COMPANY
EAST BRIDGEWATER, MASSACHUSETTS

FOR SALE

1—Portable jolt stripper molding machine — Johnston & Jennings. Brand new.
1—#612-B portable jolt rollover pattern draw machine. Brand new—Johnston & Jennings. (Above machines have never been used or installed)
1—4" ⅛th bend "Elbow" pattern. One split hardwood pattern on hardwood squeezer board, two one-half strike off core boxes.
2—4 x 4" patterns mounted on 2" white pine board with 2" battens. Suitable for cope & drag equipment mounted for use on 20 x 36 inch slip off or pop off flask.
2—4 x 4" Y patterns mounted same as above for same size flask.
2—4 x 2" T patterns mounted same as above for same size flask.
2—4 x 2" Y patterns mounted same as above for same size flask.
(All above patterns are suitable for extra heavy soil pipe fittings.)

Above patterns are like new and original cost was $810.00 for patterns and core boxes. Seller willing to sacrifice for $540.00 for quick sale.
Above patterns and machines may be seen at:

AMERICAN CAST PRODUCTS INC.
ORRVILLE, OHIO
or call
SUperior 3737, Cleveland, Ohio
for further information.

FOR SALE

1—5000 CFM—20 OZ. Roots Connorsville Positive Pressure Blower, complete with 30 HP slip ring motor and controls and resistance for 440 V. 3 PH 60 Cy.
1—Lot Aluminum Snap Flasks.
1—7' x 10' Platform Howe Scale (Beam Type) Jolt Squeeze and Jolt Rollover Molding Machines.
1—5 ton Lohed Hoist with travel and all controls for 230 volts D.C. (Present trolleys set for 15" I Beam.)
1—#3 William Frick Punch Press.
1—Lot of Ladles—Gear and plain bail type from 27" x 27" to 52" x 52".
1—Lot American AAWW Sand Cutter Parts.
1—Lot Beardsley Piper Motive type Junior Sand Slinger Repair Parts.

GUNITE FOUNDRIES CORP.
ROCKFORD, ILL.

FOR SALE

"NEWTON" 3-SPINDLE VERTICAL DRILL PRESS.

"NEEDHAM" 4-SPINDLE INCLINED REAMING MACHINE (BORING MILL).

ACORN IRON & SUPPLY CO.
915 N. DELAWARE AVE.,
PHILADELPHIA 23, PA.

FURNACE FOR SALE

Monarch simplex #94 rotating aluminum and brass melting furnace, 2000 lb. brass capacity; good condition and is on skids ready for shipping $950. Address: FLORIDA DIE CASTING FOUNDRY, P.O. BOX 1589, ORLANDO, FLA., PHONE 2-1838.

For Sale

FOR SALE
ALL EQUIPMENT REBUILT & GUARANTEED IN STOCK

OVERHEAD ELECTRIC TRAVELING CRANES

	TONS	MAKE	SPAN	CURRENT
(2)	1½	Shepard	18'0"	230-VDC.
(2)	3	P & H	47'4"	220-VAC.
(1)	3	P & H	59'8"	220-VAC.
(1)	5	P & H	40'0"	230-VDC.
(1)	10	Shaw Box	40'0"	220-VAC.
(1)	10	Northern	60'0"	440-VAC.
(1)	25/5	Niles	80'0"	230-VDC.

ELECTRIC MONORAIL HOISTS

(1)—½-ton American LoHed 230-VDC.

(6)—½-ton Shepards, 230-VDC., 5-HP. motor HIGH SPEED, FL. OP., 30'0" lift.

(1)—1-ton Shepard 230-VDC., FL. OP.

SPECIAL: 7½-ton, 2-motor, cage operated, Shepard 230-VDC., 40'0" lift, enclosed for out door service, hoist 28/70-FPM., Trolley 400-FPM., an excellent hoist for scrap yard service or cupola charging.

ALL ABOVE IN STOCK OFFERED REBUILT & GUARANTEED.

SEND FOR OUR STOCK LIST OF A.C. & D.C. GENERAL PURPOSE, CRANES & MILL MOTORS, ELECTRIC BRAKES & CONTROL EQUIPMENT, MOTOR GENERATOR SETS, TRANSFORMERS, ETC., OF ALL SIZES.

T. B. MACCABE COMPANY
4300 CLARISSA ST.
PHILADELPHIA (40), PENNA.

FOR SALE

4—Osborn Jolt Rollover Machines, Serial Number 10216 and 10260.
2—Osborn Moulding Machines, Serial Number 10291.
1—Osborn Jolt Machine, 20" x 27" table.
1—Royer Shakeout Machine with motor. Machine is 64" long and 52" wide with table 29" x 58". Machine used only two months.
1—Sturtevant Blower, Size #45, Serial Number 7641. 16½" inlet and outlet with 8" drive pulley.
1—Hoffman Portable Vacuum Cleaner with 220-440 volt motor; Size PC150, Serial Number 114431. Hose and attachments included. Machine used once and is as good as new.
3—Tabor Jar-Squeeze-Draw Stripping Machines. Will take stripping plates up to 16" wide and 30" long.
1—36" Coombs Gyratory Riddle with 220-440 volt motor, 12 extra ⅜" screens and 1 extra screenholder complete.
15—Ten foot lengths of roller conveyors 18" wide with stands adjustable to a height of 16" to 20". All in excellent condition.
4—Osborn Jolt and Squeeze Machines. Machines numbers 74J and 75J.

OLD COLONY FOUNDRY COMPANY
EAST BRIDGEWATER, MASSACHUSETTS

FOR SALE

1—Beardsley & Piper No. 60 Speedmuller with 75 HP, 220/440 volt, 60 cycle, 3 phase motor starter and ammeter.
2—Milwaukee high production jolt squeeze moulding machines No. 214-23 with power flask carriers 10" draw. 21" squeeze cylinder. Will handle patterns up to 21" wide x 36" long.

DEZUBIK SHOWER COMPANY—SARTELL, MINNESOTA

FOR SALE

60-TONS STEEL FLAT BARS

548 pcs. 4½" x ⅞" x 20'
200 pcs. 6⅛" x ½" x 20'

ACORN IRON & SUPPLY CO.
915 N. DELAWARE AVE.,
PHILADELPHIA 23, PA.

FOR SALE

Magnetic separator, Dings type XM 12" x 16" with Motor. New—in original crate. Write Box 41, Ithan, Pa.

Classified Advertising

For Sale

FOR SALE

1—Ransohoff Water Mill 36 x 60 side loading and end loading. Automatic star separation and star return. Complete with direct drive and in good condition.

1—405 Osborn Jolt Roll-over pattern draw; jolt cylinder 12" dia. Pattern draw 18" max. flask limit 64".

1—46" dia. x 56" inside length tumbling barrel.

1—Battery of four 24" x 54" tumbling barrels.

2—30" x 52" tumbling barrel only.

1—30" x 38" tumbling barrel only.

4—18" x 52" tumbling barrel only.

BOX 635

The FOUNDRY CLEVELAND 13, OHIO

FOR SALE

1—#3 Demmler Core Blower—price $750.00 f.o.b. Chicago, Ill.

1—#4 Demmler Core Blower—price $1,050.00, f.o.b. Chicago, Ill.

Registered as an Approved Dealer by War Assets Administration. Send us your inquiries.

SCULLY MACHINERY & EQUIPMENT CO., (NOT INC.)

CHICAGO 2, ILL.—PHONE: STATE 5346

TURBO BLOWERS

(4) 675 cfm @ 6 oz., Spencer, driven by 2 HP, 220/440 V., 3 ph. 60 cycle 3600 RPM

PRESSURE BLOWERS

1200 cfm @ 11 oz. Buffalo with 7½ HP, 220 volt, 3 ph. 60 cy. 1750 RPM

1100 cfm @ 16 oz. Sturtevant 8 x 8, 24" dia. wheel

800 cfm @ 24 oz. Amer. Blower with 10 HP, 220/440 volt, 3 ph. 60 cy. 3600 RPM

500 cfm @ 14½ oz. McKee 6 x 6 with 5 HP 3600 RPM

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVENUE
CLEVELAND 14, OHIO

FOR IMMEDIATE SALE

1—Northeast Turbo Compressor 2000 cu. ft. per min.—30 H.P. 3500 R.P.M., 3 ph. 60 cy. 440 Volt A.C. $650.00

1—General Electric Turbo Compressor 1950 C.F.M., 27½ H.P. 3500 R.P.M., 3 ph., 60 cyc., 440 V.A.C. Motor $750.00

1—Spencer Turbo Compressor 1300 C.F.M., 25 H.P. 1750 R.P.M., 3 Ph., 60 Cy., 440 V., A.C. Motor $700.00

2—Spencer Turbo Compressors 600 cu. F.M. 15 H.P., 440 V., 3 Phase-60 Cycle. . . $400.00 ea.

1—Exhaust Blower for sand or cleaning system with ball bearings and totally enclosed 440 V., 3 ph., 60 Cycle A.C. Motor V Belt drive, 50 H.P., 1760 R.P.M. $575.00

1—Lancaster 6 ft. Counter Current Batch Mixer E.A.G.4 1940—#4073, 15 H.P., 1165 R.P.M. 220/440 ..... $2100.00

BOX 158

THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE

1—6'3" diameter Heroult melting furnace, rated one ton per hour, with holding capacity of 4000/4500#, with motors, roof rings, electrode holders, ladles, etc. and including 1000 kva. 22,000 to 110 volt transformer, 3 phase, 60 cycle. Also includes other electrical equipment ready to set up. Inspection invited. Address: FIRTH STERLING STEEL COMPANY, McKEESPORT, PA.

EQUIPMENT FOR SALE

MOLDING MACHINES

2—#40 Milwaukee Jolt Rollover Draw Stationary above floor line type.
4—Tabor 22" Portable Shockless Jar Power Rollover Power Draw, Air Clamps, 22"x42" plate, 10" draw.
1—30"x40" Tabor Portable Shockless Jar Power Rollover Power Draw, Air Clamps, 1000# Cap. 12" Draw.
10—International Stationary Type JDP Jolt Ram, Power Lift, 1600# lift cap., 10" lift.
1—International Stationary Type JDP Jolt Ram, Power Lift, 3000# lift cap., 10" lift.
10—Grimes #C-414 Hand Rollover Machines.
1—Arcade Modern No. 2-38 Portable or Stationary Hand operated Squeeze Rollover Draw with swing out table.
5—Mumford 3" Cyl. Core Jolt with 20"x15" table.

BLOWERS FOR CUPOLAS & FURNACES

North American 16-Oz. Direct Connected Blowers:
2—20 H.P. 2700 C.F.M.
2—10 H.P. 1300 C.F.M.

Maxon-Premix Blowers for Gas ⅛ to 1 H.P.

METAL MELTING EQUIPMENT

New 32" to 41" dia. shell cupolas made to order.
2—Hausfeld Open Flame Tilting Brass Furnaces, 400" Cap. Gas or Oil.
4—Stationary Gas Fired #60 Crucible Furnaces with ¼ HP. Maxon-Premix's.
2—Monarch-Rockwell Rotating 500 lbs. brass. Oil.
1—Iler Aluminum and Bronze Melting Furnace #60 Crucible, oil fired, with blower and motor.

TUMBLING MILLS AND SAND BLAST

4—New Haven 36"x46" Self Contained Sand Blast Barrels. Belt Drive.
2—Pangborn Syphon Feed Sand Blast Cabinets.
1—2000# Cap. V-Ball Worm Geared Crane Ladle.
1—Barrel Type Magnetic Separator—AC driven with DC Generator.
3—Portable Sand Blast generator tanks 500 lbs. sand capacity.
1—4000# cap. Tilting Crane Ladles, V-ball, worm geared.
1—Heavy Duty Back Geared Sprue Cutter 1¼" square knives. T & L pulley drive.
1—Core Wire Straightener and cut-off to handle wire from coil.
1—Approx. 8 cu. ft. Tilting Trough type sand mixer.

Air Compressors 1 to 60 H.P.

CLIFTON MACHINERY CO.
1023 W. 6th ST. CINCINNATI 3, OHIO
PHONE PARKWAY 7812

FOR SALE

Leitz model Mo. metallurgical microscope with Leitz "Casto" camera, Bausch & Lomb illuminating unit, polishing equipment and supplies, metallographic textbooks. Address: Box 159, The FOUNDRY, Cleveland 13, Ohio.

HEAVY METAL SHEAR

Canton #2 alligator shear with extra set new 24" blades. On skids ready for shipping. Will sell for $1200, or best offer. Address: FLORIDA DIE CASTING FOUNDRY, P.O. BOX 1589, ORLANDO, FLA., PHONE 2-1838.

FOR SALE

Complete equipment for gray iron and nonferrous foundry. No. 3 Whiting cupola with skid charger, blower and Foxboro air weight control, 3 bronze melting furnaces, core oven, flasks, etc. Much of this equipment is less than 6 months old. Send for list. Address: Box 191, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Macleod "Blast Tumbling Barrel" type-S suction design. Complete with motors and dust collector. A-1 shape ready to operate.

LINDENHURST FOUNDRY, INC.
74 E. Hoffman Ave. Lindenhurst, L. I., N. Y.

FOR SALE

1—American Foundry Equipment Company sand-blast room, 10' x 12' steel construction, double door. Price $750.

NATIONAL PLUMBING FIXTURE CORP.
ELLWOOD CITY, PENNSYLVANIA

FOR SALE

Practically new #3 Whiting cupola with Foxboro control less blower. Address: GREEN COLONIAL FURNACE CO., 322 S. W. THIRD ST., DES MOINES 7, IOWA.

For Sale

FOR SALE

SENECA FALLS 4" LO SWING PRODUCTION LATHE

VERY LOW PRICE on this powerful high production lathe. 60" centers; geared head; 9 speeds on carriage, 6 speeds on spindles; 8 tools and cross slides; 5 h.p. 3 ph. AC motor; hardened steel ways and gears. For work on heavy steel forgings; does several operations at one time.

JAY SALTER
306 ROSEDALE ST., ROCHESTER, N. Y.

FOR SALE

Used No. 183 Milwaukee jolt, squeeze, stripper molding machine—18" diameter squeeze cylinder, 5" diameter jolt cylinder, maximum pattern width 20", flask width 24". Distance between table and squeeze head 19" maximum. 8" draw. Address: Box 164, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

1—#2 Pangborn Type "GF" Cleaning Barrel—Used—Loading Capacity 2½ cu. ft. or 250 lbs. Includes ½ H.P. 220 Volt, 60 Cycle, 3 Phase Electric Motor and Starter.
1—#2 Whiting Cupola—Diameter inside lining 27"—Capacity 2 ton per hour. Equipped with 1-#2 F. M. Roots Blower for #2 Whiting Cupola with V Belt drive. Approximately 70 ft. 10 in. Blower Pipe.
1—Pedestal Grinder 38" between wheels. Takes a 12" x 2½" Grinding Wheel—Belt Driven.

H. W. CLARK CO.
MATTOON, ILL.

FOR SALE

1—Used 44" American sand cutter serial #173. Equipped with 1—3 HP 1800 RPM 3 phase, 60 cycle, 220 volt cutting cylinder motor and 1—1 HP two-speed 600 RPM—1800 RPM ground travel motor. Complete with one extra set of blades and one extra set of bearings. Address: Box 165, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

New heavy duty motorized rod cutter, 65 cuts per minute; capacity: ¾ inch round hot rolled steel. Brand new. $890.00 f.o.b. Cleveland. Address: Box 772, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

One Robins portable shakeout and sand riddle, 3 ph. 60 cy, 220 v. NEW, original guarantee. Address: HILLSDALE FOUNDRY CO. INC., HILLSDALE, MICHIGAN.

FOR SALE

Roto-Cast revolving mold conveyor. 12' diameter, 5 months old.
2—Tabor hand ram rollover molding machines.

WELLMAN BRONZE & ALUMINUM CO.
6017 SUPERIOR AVE.
CLEVELAND, OHIO

FOR SALE: SPECIAL!

Norton double 16" grinder; 5 h.p. motor in base; ball bearing. 3 Federal rapid squeezers. Osborn jolt stripper and squeezer. Iron ladle; 300 lb. capacity; like new.

JAY SALTER
306 ROSEDALE ST.
ROCHESTER 7, N. Y.

FOR SALE

Tumbler, square, barrel size, No. X54N.T., mfg. W. W. Sly.

ABBOTT SALVAGE COMPANY
1087 CLINTON ST.
BUFFALO 6, N. Y.

BENDING BLOCKS OR SLABS

5' x 5'. App. 6" thick. Semi-steel. 1⅝" holes on 6" centers, staggered throughout in blocks. Also stands, carrying 1-block and others multiple stands, for 2, 4 and 8 blocks.

ACORN IRON & SUPPLY CO.
915 N. DELAWARE AVE.,
PHILADELPHIA 23, PA.

HIGH SILICON IRON.

"JISCO"

JISCO SILVERY IN YOUR CASTINGS MEANS QUALITY

• JISCO is a blast furnace product. Only virgin ores are employed in its production. This eliminates the possibility of contamination from alloys frequently present in scrap metal.

JISCO SILVERY is a pure high silicon iron, which when blended with your other melting stock enables you to produce castings of *assured high quality.*

Castings containing JISCO have fine grain, uniform structure, better strength and machineability. The modern Foundryman finds JISCO a "must" in the production of quality castings.

Our Metallurgical Department will be glad to give you complete information.

From an address by Andrew Jackson to the Congress:

"Experience should teach us wisdom. Most of the difficulties our government now encounters, and most of the dangers which impend over our Union, have sprung from an abandonment of the legitimate objects of government by our national legislation."

THE JACKSON IRON & STEEL *Company*

JACKSON, OHIO.

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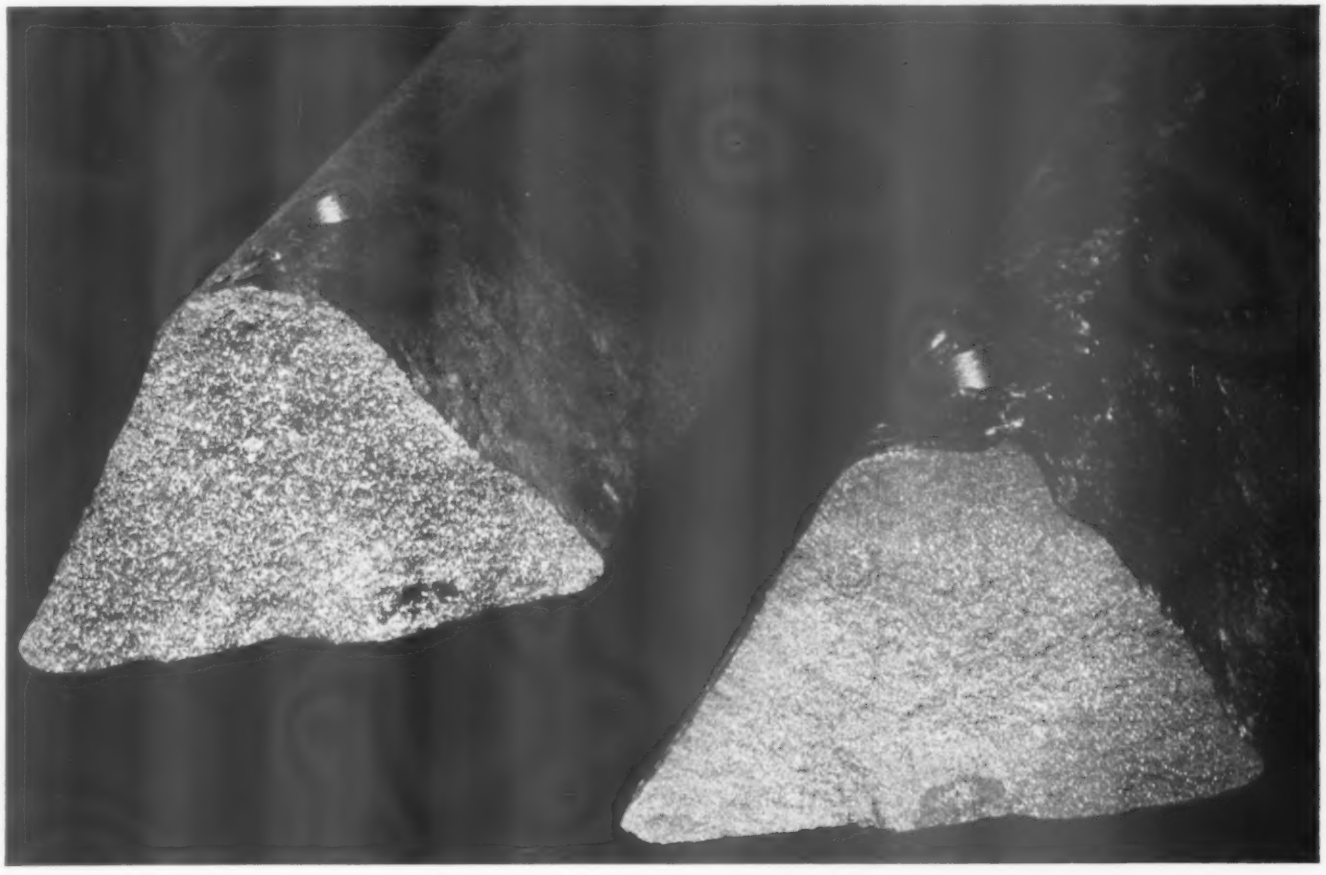
YOU CAN "SEE" THE DIFFERENCE



THIS interesting photograph of two pig sections permits you literally to "see" the difference between *G-Iron and regular iron.

Examine each closely. Note the refinement of grain structure of the *G-Iron pig (right) as compared with the regular pig (left)... *convincing evidence of *G-Iron superiority.*

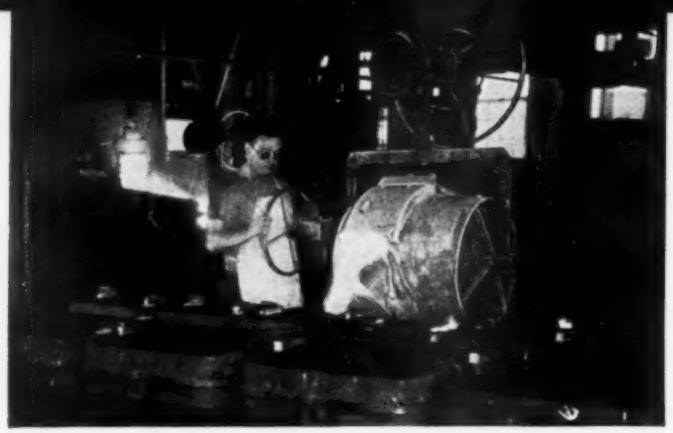
*G-Iron is graphitized pig iron. A patented blast furnace process refines the grain structure of the pig—and this refinement follows through to the final casting. The finely distributed graphite increases fluidity and reduces chill in thin sections—improves machinability and helps overcome shrinkage and porosity between thin and heavy sections.

TONAWANDA
for sound castings

TONAWANDA IRON CORPORATION

NORTH TONAWANDA, N. Y.

Division of AMERICAN RADIATOR & Standard Sanitary CORPORATION



INSURE DELIVERY

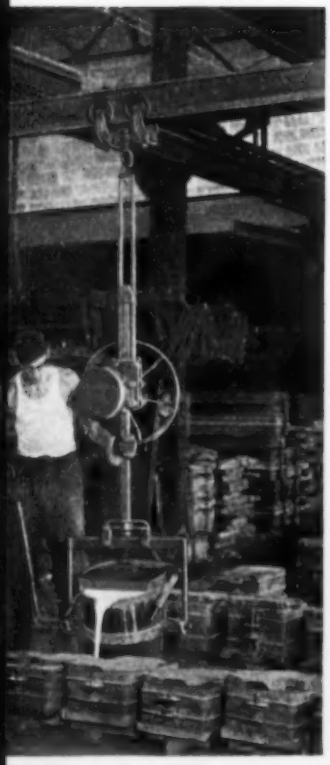
of your MODERN pouring devices before summer comes

PLAN NOW

One man can do the work of a costly pouring gang if he is equipped for action with pouring devices by *Modern*. For effort without strain . . . . for pouring continuously without exertion . . . . *Modern* covered ladles make it possible to handle a larger amount of metal at one time and to hold it for a longer period. These values will be especially significant when next summer's hot days arrive. *By making plans now* and placing your order without delay, you can be assured of early-Spring-Delivery.

WRITE FOR BULLETIN No. 143

* For a complete story of pouring device and ladle equipment, send for this 18-page catalog.



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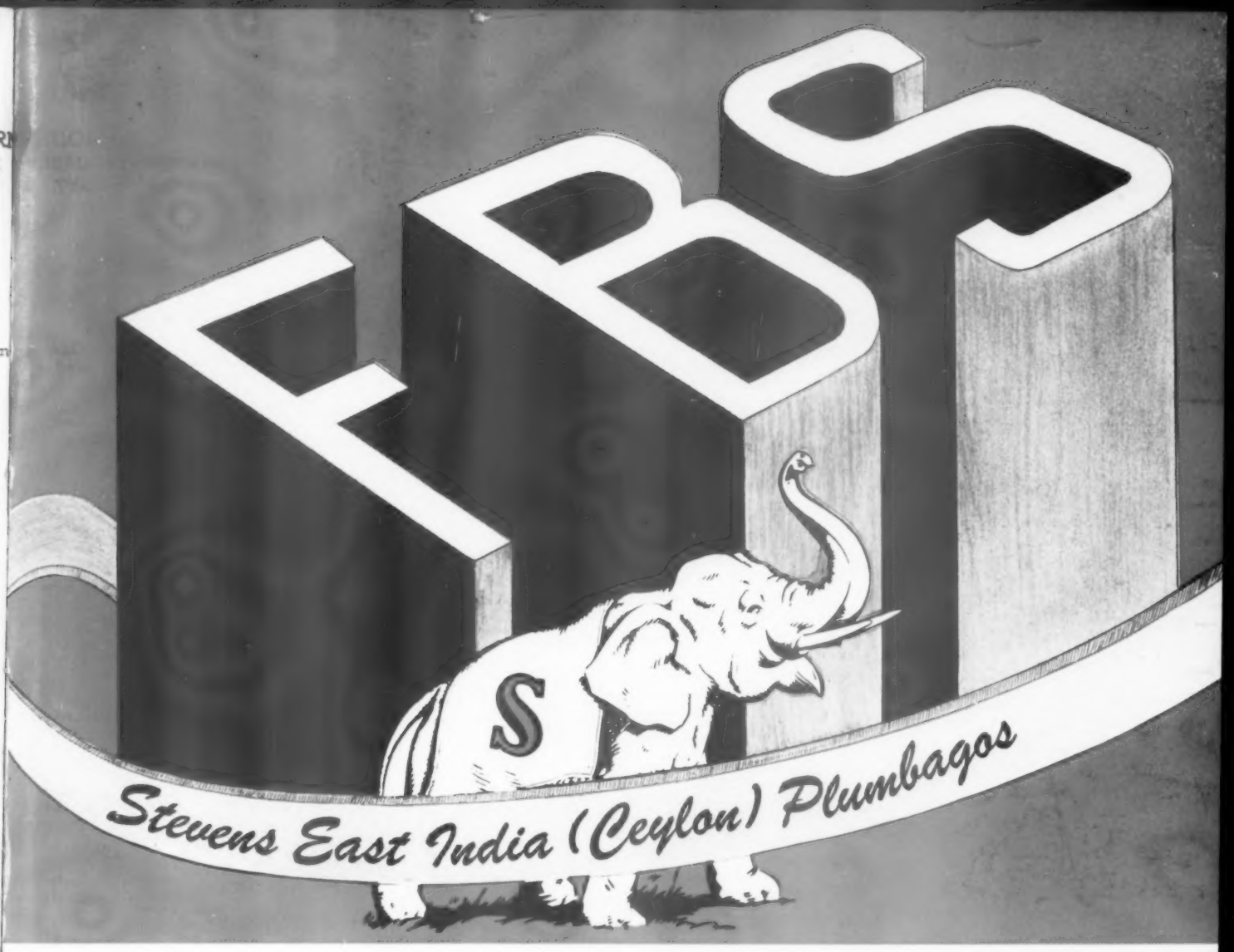

Based on the incomparable Ceylon East India Graphite, Stevens Plumbagos are made by blending varying percentages of several graphites to produce specific characteristics—thus forming a series of grades that meet all foundry requirements—for either dry or wet application.

There are six important factors to be considered in selecting Plumbago, namely:

1. *Size and thickness of castings.*
2. *Whether they are to be sand-blasted or machined.*
3. *Quality of finish desired.*
4. *Type of molding sand used.*
5. *Are molds green sand, dry sand or skin-dried?*
6. *Method of applying Plumbago.*

If you will furnish us with this information, we will gladly make our recommendations and send you a working sample of the grade best suited to your requirements. Or, better still, order a barrel of our recommended grade on approval. If the product is not all we claim it to be, return it for full credit.

Our large importation of Ceylon Graphite, with resultant ample stock, enables us to supply an outstanding Plumbago at reasonable prices.

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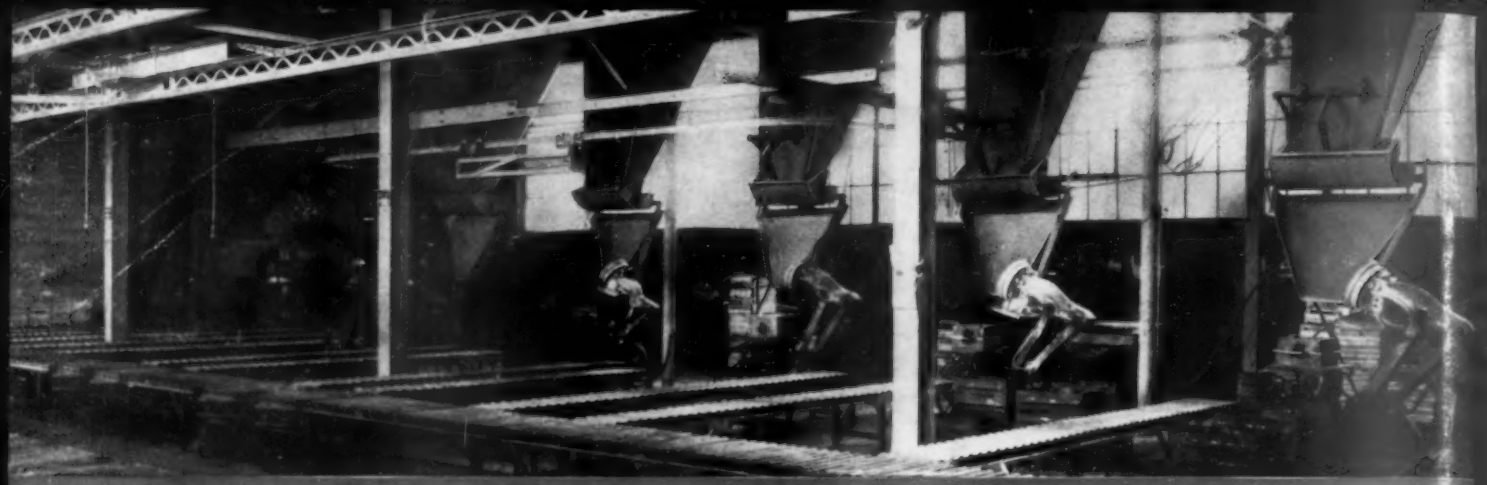


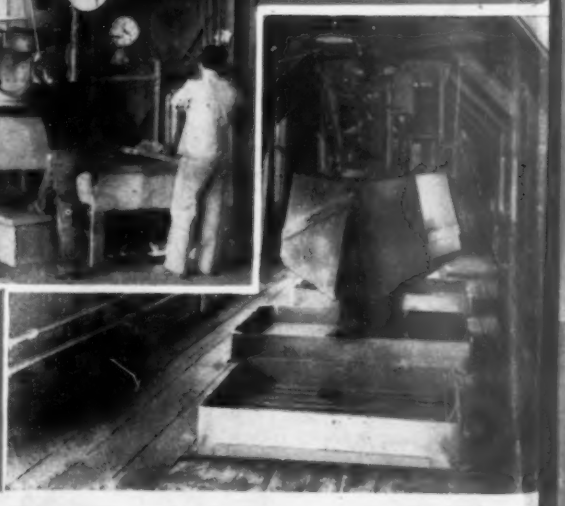
General view of foundry employing Link-Belt Sand Preparation and Handling Equipment. View shows molders' stations and hoppers and roller conveyor lines.

CASTALLOY COMPANY

Mechanizes Foundry to double production of magnesium and aluminum castings

Link-Belt vibrating screens over bin—one for magnesium sand, the other for aluminum sand. →

Mixing station under partitioned bin, one side for magnesium sand, other side for aluminum sand. ←



Discharging sand to molders' hoppers. Bucket may be used to handle either magnesium sand or aluminum sand. →

• The Castalloy Company, Cambridge, Mass., produces both magnesium and aluminum castings, requiring the preparation and handling of two different kinds of sand.

The Link-Belt handling and preparation equipment engineered and installed in the Castalloy Foundry, has a capacity of 20 tons of sand per hour, either aluminum or magnesium sand. Sand preparation equipment is arranged so that the 19 molding stations can be provided with either sand. Adjacent molders can be working on magnesium and aluminum molds at the same time. Roller conveyors permit easy movement of molds to proper conveyors for aluminum and magnesium pouring.

Production of castings has been increased more than 100%. The product has been improved. The foundry is clean, neat, orderly. Molders are more efficient and less fatigued.

LINK-BELT COMPANY

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LINK-BELT *Sand Preparation* **EQUIPMENT**